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Engineering News-Record

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October 29, 1931

Engineers Discuss Water-Sewage-Water Cycle

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Bituminous Macadam Highways in Rhode Island

Winter Construction of Upper Notch Dam and Power Plant

Rochester Plans Work for Unemployment Relief

Specification Testing of Thick Steel Plates

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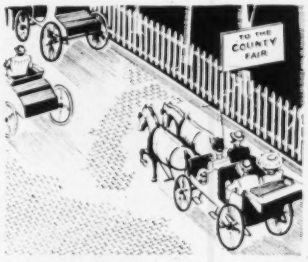
Constructing Modern Bridges in Palestine

Meeting of American Society of Municipal Engineers

Age 24 Years *Maintenance* $0.00

Broadway and Ninth Street, Columbia, Mo.—Paved in 1906

THE TRUE measure of the cost of any pavement is the cost-per-year for the life of that pavement. Maintenance expense must be figured in. Compare paving materials on this basis instead of by deceptive first costs alone. You will see why it is that brick-surfaced pavements are always known as economical pavements.



For example, take Broadway and Ninth Streets in Columbia, Missouri, carrying the heaviest traffic in the city. This pavement was laid nearly a quarter of a century ago. In twenty-four years not one cent was spent for maintenance! On a cost-per-year basis, the bill to the community for this pavement is insignificant.

Throughout the United States, brick pavements have set amazing economy records. With modern construction methods and the improved brick being manufactured today, modern brick-surfaced pavements should set even greater records for economy as well as for lasting smoothness.

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ENGINEERING NEWS-RECORD

A WEEKLY JOURNAL OF CIVIL ENGINEERING AND CONSTRUCTION PRACTICE

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F. E. Schmitt, Editor

OCTOBER 29, 1931

Timely Action

THE week's best news comes in the statement of Charles M. Reppert at the Municipal Engineers' meeting that Pittsburgh will start its cooperative work-relief construction *next week*. Such early start on the emergency employment program is timely help indeed. The unemployed need work now; already the rigors of winter are threatening, and even without them the hardships of the jobless are great enough to be worth relieving. While many cities have plans to get job-work going, most of them still have to find the jobs and thereafter to plan and organize. It is something to get work under way in January—better, that is, than to start in February. But jobs in November and December are immeasurably more valuable. Pittsburgh deserves praise for its forehanded, energetic progress. There are other cities that can start jobs soon if they will follow Pittsburgh's example, or if they will do what the Municipal Engineers urged on the federal government—namely, use all available resources to make public works effective for relief.

Promise of New Strength

THAT the American Society of Municipal Engineers gave prominent place in its convention activities to unemployment is natural, in view of the surpassing importance of the problem in the day's concerns. City officials are in the key position with respect to this problem: It is they who must provide most of the jobs this winter, since private employment continues at low ebb and federal public work apparently is not to be further expanded. But though this intimate relation between the society's members and unemployment is sufficient to account for the symposium which formed the high spot of the convention, the event nevertheless gives proof of a live, progressive spirit in the society. This same spirit carried over into normal times will spell strength and effectiveness beyond anything attained in the society's past history. The organization has a vastly extensive field of activity, broader and more influential than that of any engineering body, since it involves the whole range of community existence. To do justice to the many grave problems scattered over this field will require enthusiasm, determination and wisdom. There are evidences that the society is developing these attributes and is preparing for a future of useful service. Organization of a live local chapter in St. Louis is the first evidence of this new vitality. Chapters in Philadelphia and Milwaukee are expected within a reasonable time. A definite program to stabilize city engineering and to educate the public through chapter contact with leaders in non-technical civic organizations has worked so well in St. Louis that it will be fostered in many other large cities. The society, now that it has revamped its organization and policies to fit its new name, bids fair to assume heavy responsibilities for the municipal engineer and his staff. From them it deserves enthusiastic support.

Engineer at Work

LOCAL engineering groups are getting into harness to take on the responsibilities which the emergency places upon them. The New York metropolitan group is at work with an effective organization, Pittsburgh's civil engineers are organizing, Chicago is on the way and many other groups must have plans in shape even though reports are lacking. The first responsibility of these groups is to look out for their own; the next, to put all the abilities of the engineering profession at the service of those public agencies which are trying against great odds to find and organize work for all the unemployed. Assisting their brother engineers whose clients or jobs have disappeared can usually not be done by providing new clients and jobs. But a local emergency loan fund to carry them over until the resumption of business will work wonders. Ready support of every such engineer's emergency fund is certain; every engineer will give this fund first call on his available resources, in preference to the various general relief movements in progress. For the engineer, though often thought unsocial, is in reality a warmblooded being. The fellowship of the profession always has a strong hold on him, and this year's incomparable opportunity will bring this feeling to expression. If quick and thorough organization of local engineering groups is set up, its success is assured.

An Auspicious Beginning

IN EVERY respect the opening of the Hudson River bridge at New York measured up to the commanding position that the structure has assumed in the engineering world. The official ceremonies on Saturday afternoon vied with numerous football games in interest and attendance. And the opening day's traffic on Sunday reached the unprecedented total of 60,000 motor vehicles and 40,000 pedestrians. The opening ceremonies deserve more than passing mention. Dedication exercises for public structures are usually little more than political rallies with enough parade and pageantry added to make the speeches bearable. The fact that the structures represent engineering achievements is too often entirely ignored. This was not the case with the Hudson River bridge. The speakers obviously were impressed with the engineers' skill and craftsmanship, and voiced their admiration directly and by implication. It is too much to hope that these exercises set a precedent for dedications to come,

but it is nevertheless gratifying that for once praise for a job well done outweighed vote-enticing oratory. The rush to cross the bridge after it was opened affords evidence of the appeal that a Hudson River crossing holds for residents of the New York metropolitan area. When the Holland tunnel was opened there occurred a similar flow of interstate traffic, yet its opening day's record has been exceeded several times since. The official estimate for the bridge places the number of vehicles to use it during its first year of operation at 8,700,000, or about 24,000 daily. If its auspicious opening is any indication, the operation record will compare favorably with the high standard set by the planners and builders of this great bridge.

Test the Law

THE Illinois prevailing-wage act has been declared unconstitutional by the highest court in the state. How does this decision effect the status of the federal Bacon-Davis law? Its constitutionality, though often questioned, has never been determined. Some day its validity will be challenged in a test suit. Why not now? The longer it is delayed the greater the confusion if the act is found invalid. The law as it now stands is objectionable and unfair to contractors. Yet organized contracting is taking the attitude that nothing can be done to remove it from the statute books. The Associated General Contractors is proposing amendments to the existing Bacon-Davis act which would provide that prevailing rates to be paid must be stated when bids are requested. But it must be remembered that the Illinois law contained such a provision, yet the act was troublesome and unworkable. Perhaps the contractors hope that they can open up the Bacon-Davis bill, insert a few favorable amendments and then close the proceedings before other interests can tear the bill apart; but, even if they were successful in the attempt, the final result might be more disastrous to contracting than is the existing law. The fate of the Illinois wage act indicates a chance that the Bacon-Davis bill might prove invalid if tested. Before great efforts are made to revise the law, organized contracting should make the test.

Evils of Pretenders

LOUISIANA public works are again experiencing repercussions from gubernatorial politics. The opera-bouffe contest between Governor-Senator Huey P. Long and Lieutenant Governor Paul N. Cyr for the honor and privilege of being state executive is making the bond underwriters cautious. They do not even see anything amusing in the suit brought by a citizen named Aldrich to oust both Mr. Long and Dr. Cyr and put himself into the executive mansion at Baton Rouge. Consequently they are not showing the expected willingness to underwrite $5,000,000 of road bonds, to which the highway commission looks for money to pay its road contractors, and much less to purchase another $7,000,000 of bonds for the construction of a bridge across the Mississippi at New Orleans. The highway commission is notifying its contractors to be prepared to curtail operations or to proceed at their own risk. Meanwhile it will try to encourage bond buyers. As road bonds previously marketed are now quoted under par, the outlook is not considered cheerful. The commission has made a remarkable record in roadbuilding for ten months of this year, and has plans prepared for equal activity in 1932, but this program will suffer and the morale of the department's engineers and contractors will be badly weakened if political bickerings are allowed to halt progress. For the sake of a road improvement which has long been needed and for which the people have sacrificed much, wiser council should lay its hand on governor and pretender and bring them to reason.

Another Way Out

THE Interstate Commerce Commission's denial of the railroad companies' plea for a flat 15 per cent increase in freight rates leaves the whole railroad situation in a worse muddle than ever. The commission has denied any flat increase in rates. Instead it states that it will grant increases in rates on specific commodities *if* the railroad companies will place the money obtained from those increases in a general pool for the aid of railroads that are unable to meet interest charges on their bonds.

Protection of bonds from default was the basis of the railroads' application for increased rates. But a general increase sufficient to give the necessary relief to the railroads in financial difficulties would give the more prosperous roads an increase in income beyond what is warranted in the present emergency and would add needlessly to the burden placed upon industry in an attempt to aid the weak roads. Because the commission did not think this increase in return to the prosperous roads justified it denied the application. As a result the railroads find themselves faced with the alternative of accepting the commission's proposal or attempting to increase their net income by wage reductions.

Refusal to accept the commission's proposal would, however, place them in the position of having declined proffered help, a position in which the chance of having wage reductions made effective would be small indeed. Consequently the Association of Railroad Executives, after stating its views as to the questionable legality of the commission's proposals as now made, has undertaken to work with the commission in the development of a plan for putting the commission's proposal or a mutually acceptable alternative into effect by December first, the date set by the commission for acceptance of its plan. The railroad executives in so far as they favor the scheme at all favor using the pool as a source of loans rather than gifts to the weak roads.

The issues involved in the commission's action in this case are so complex and in some respects bear so directly upon the fundamentals of railroad regulation that we shall not attempt to discuss them here. Assuming, however, that the rate increase issue is closed for the moment by the commission's action and that the only way of getting the railroads out of their present difficulties is by some such financial pool as the commission and the railroads now propose to discuss, there is one element of such a pooling arrangement that deserves consideration by railroad executives.

A financial pool for the aid of weak roads has greater possibilities in the present emergency than simply that of providing funds to meet obligations in danger of default. It can be made to react to the benefit of all railroads as well as business generally. The commission's plan for outright gifts to the weak roads from the fund created by the increased rates or the railroad execu-

tives' alternative of loans rather than gifts can hardly be of help to the roads in distress until February of next year because the increased rates do not go into effect until December. Many railroads need help now. If, as the railroad executives believe, the loan plan can be put on a practicable basis it should not be held until next year to be put into effect. It should be made effective as soon as possible. All railroad companies are not badly off financially; some of the more prosperous earned over 10 per cent upon their common stock during the first six months of this year. If the presidents of the prosperous roads were to act as quickly as did the bankers who responded to the President's plea for a fund to relieve banks in distress a railroad loan pool could be created by mid-November through immediate contributions from the prosperous roads. Such action would extend help to the weak roads three months in advance of the earliest date at which the fund from increased rates would become available. Improvement of the credit of the weak roads would automatically improve the credit of all railroads. Further, it would go a long way toward the restoration of confidence in business conditions generally. That in itself would more than repay the strong railroads for the cost involved in the immediate creation of a revolving fund for the relief of the weak roads.

The Changing Scene

CIVIL ENGINEERING has always been a profession with widespread interests. As time goes on these interests become broader rather than narrower. New fields open up and old fields spread out.

There is the problem of airport design and construction; likewise the integration of the airplane with already highly developed transportation facilities. There is the modern necessity for mass production of hard-surfaced highways. Bridges too are required that surpass all precedent both in technical and financial aspect. There is the unprecedented demand for natural-gas pipe lines, together with the possibilities that the new discoveries of natural gas may bring about a radical revamping of heating and power supplies of our large cities and industries. Lately rust-resistant steel alloys and structural aluminum have become available in quantity, and their advantages must be evaluated and their fields of use determined. All these new problems are the direct result of the changing scene of modern life that brings engineering and economics into closer contact.

Slack business has again focused attention on elementary economics and the operation of its principles in the field of engineering construction. The "new era" doctrine, the popular delusion of a few years ago, has now passed away, and the profession must adjust itself to a saner perspective. For this reason an understanding of the relation between engineering and economics has never been more important than at present.

And this raises the question whether the engineer can continue to wait for problems to force themselves upon him for help as he has always done, or whether he should anticipate the developments and know of their approach several years in advance. The latter alternative strikes a more responsive chord in the modern mind.

It is relatively easy to keep abreast of what is going on in the world by wide and thoughtful reading. And this should not be confined to specialized reading in the civil engineering field, important as that is. Keeping abreast of the developments in general business and science has become an equal responsibility. Engineers generally have accepted the idea that the technical mind benefits from development of broader interests. Professional progress in the future virtually demands not only that engineers have an appreciation of the changing scene of business but that they take an active part in shaping its course. The problems of new forms of transportation, new sources of power, new structural materials and many equally important developments yet unforeseen can then be solved more readily and more completely.

Lien Law Reform Hopeful

AFTER six years of alternate battle and reorganization of forces, the committee appointed by President Hoover, then Secretary of Commerce, to draft a model lien law has arrived at a compromise agreement, as reported in our news pages three weeks ago. It has framed an act which has received the tentative sanction of the Commission on Uniform Laws coordinated with the American Bar Association. Next year the Commission on Uniform Laws will act on final ratification, after which the law goes before state legislatures with accepted sponsorship. It should be the object of engineers and constructors to further its introduction and enactment.

Lien laws originated in the purpose of protecting the workman, who lacks means and knowledge to determine credit and to collect his dues, but they have been extended by repeated amendments to include nearly every agency supplying materials and service for construction. The original purpose of guarding the wage rights of those incapable of enforcing them has largely been lost from sight, and lien laws have grown into a system of automatic-credit assurance. In many states they leave the owner helpless to guard against duplicate payment for materials and labor. In every state, with few exceptions, they are an intricate jumble that compels recourse to court action for solving many claims.

The plan of the Hoover committee on model lien law was born of these vicious conditions. Because of these conditions also the committee has been long in arriving at agreement. Interests enjoying special privileges under the present order have been loath to forego them in recommending a new law. The consequence was that compromise on many provisions became inevitable. What has finally emerged is not an ideal document, therefore. But it is one that is vastly superior to most present laws and on the whole is reasonably fair to all interests. In particular the owner receives protection by provisions limiting his liability to the contract price and requiring notice to him of lien claims at least 30 days before completion of the contract, except in special contingencies. The right of labor to special consideration is recognized by excepting it from the necessity of giving notice of claims for lien.

It deserves to be recognized that this reasonable protection of owner and labor is largely due to the vigorous fight made for them by the engineer and general-contractor members of the committee. Engineers and contractors should now work as determinedly to capitalize these efforts by actively advancing the task of putting the model lien law on the statute books of the states. For the present the model law is only an academic accomplishment; it needs to be made a practical realization.

Power Plant in Northern Ontario Largely Built During Winter Months

Cold-weather operations speeded up by wide use of mechanical equipment—Channel operations carried on during period of low river flow in mid-winter—Power plant of unique design

By D. HUTCHISON and ROBERT F. LEGGET
Construction Superintendent and Resident Engineer Power Corporation of Canada, Ltd., Montreal, Que.

CONSTRUCTION of much of the Upper Notch dam and power plant of the Northern Ontario Power Co. was carried on during winter months under climatic conditions that added many difficulties to the work. The undertaking itself was not large as water-power developments go, but the fact that construction at temperatures well below zero had to be planned for in order to meet the power-delivery schedule and the fact that this winter work was carried out successfully without adding unduly to the cost of the project gives the undertaking special interest.

The power plant, aside from the construction operations, is notable. It has an installed capacity of 13,000 hp.; and as it is fully automatic and is designed for operation by remote control in the future, it is the largest hydro-electric project of that type in Canada. The plant is located on the Montreal River, a tributary of the Ottawa River, about 16 miles southwest of the mining town of Cobalt, Ont. It is tied in by a 110,000-volt transmission line to network serving the mining region of Northern Ontario and Quebec.

The watershed above the plant has an area of 2,550 square miles, and the river flow ranges from 2,000 to 25,250 sec.-ft. The dam and control works are designed to pass a flood of 45,000 sec.-ft.

The river has a low steady flow during the winter and a heavy floodflow in the spring of the year. The low winter flow had a considerable bearing on the construction schedule.

Operating head at the plant is 48 ft., the water level upstream being determined by the tailrace water level at the Fountain Falls plant, 5 miles upstream. At some future date it is planned to develop the drop in water level between Upper Notch and the river's outlet into Lake Temiskaming (153 ft.) in a plant to be located in the spectacular gorge known as the Lower Notch, close to the lake, from which station the Upper Notch plant will be completely controlled.

The Upper Notch power house forms an integral part of a gravity dam 500 ft. long and 70 ft. high at maximum section. Two steel sluice gates, 40 ft. wide by 24 ft. deep, electrically operated by remote or local control, occupy the central section of the dam, four 15-ft. stoplog openings adjoin them, and there is also a 50-ft. spillway section with sill at operating water level. Earth fills with thin corewalls form each end of the dam, the rock level in each case being below normal water level. The design of the gatehouse and generator room follows standard practice in general, the arrangement being well

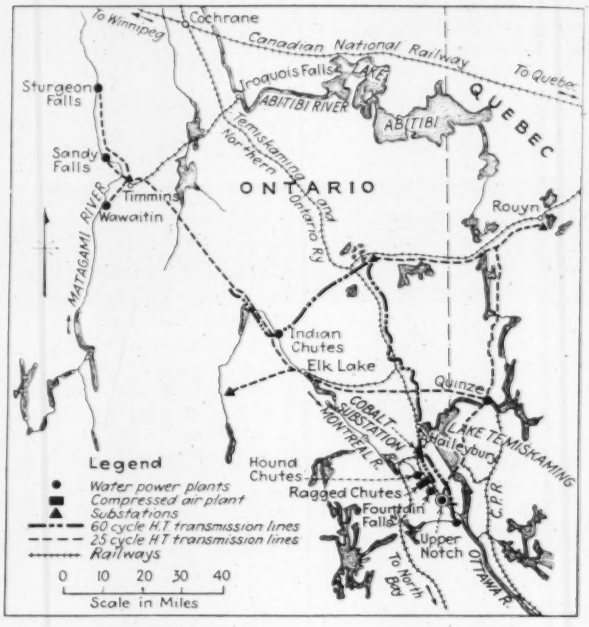


Fig. 1—Relation of Upper Notch plant to mining region of northern Ontario

[The plant at Ragged Chutes, shown as a compressed-air plant, is a hydraulic air-compressor plant of 5,500 hp., operating under a head of 48 ft. to supply compressed air to the mining area around Cobalt.—EDITOR.]

shown in accompanying drawings. Power-generating equipment consists of two 6,500-hp. Francis turbines, working at 125 revolutions per minute, coupled directly to two 6,500-kva. 11,000-volt three-phase generators. The scroll cases are of unlined reinforced-concrete construction.

The automatic features of the plant allow for operation of the entire station from a remote control; at present the starting and stopping is done manually but all else automatically. Protective devices cover all major possibilities of failure.

Construction Planning—Access to the site of the dam was obtained over a spur line, built by the construction force, from the Silver Centre branch of the Temiskaming and Northern Ontario Railway. The nearest roadhead was 5 miles away; in winter a snow road was available through the bush to Cobalt.

Clearing the site was begun on July 1, 1929. Simultaneously construction of a camp to accommodate 350 people was begun, and work on the construction plant followed immediately. Earth excavation at the dam was started Aug. 12, rock excavation Sept. 9, and the first concrete was poured Oct. 25.

Delivery of power was not required before the end of 1930, so that no unusual speed in construction was called for; yet whatever working schedule was adopted, some placing of concrete during winter would be necessary. It was decided, therefore, to take advantage of the low

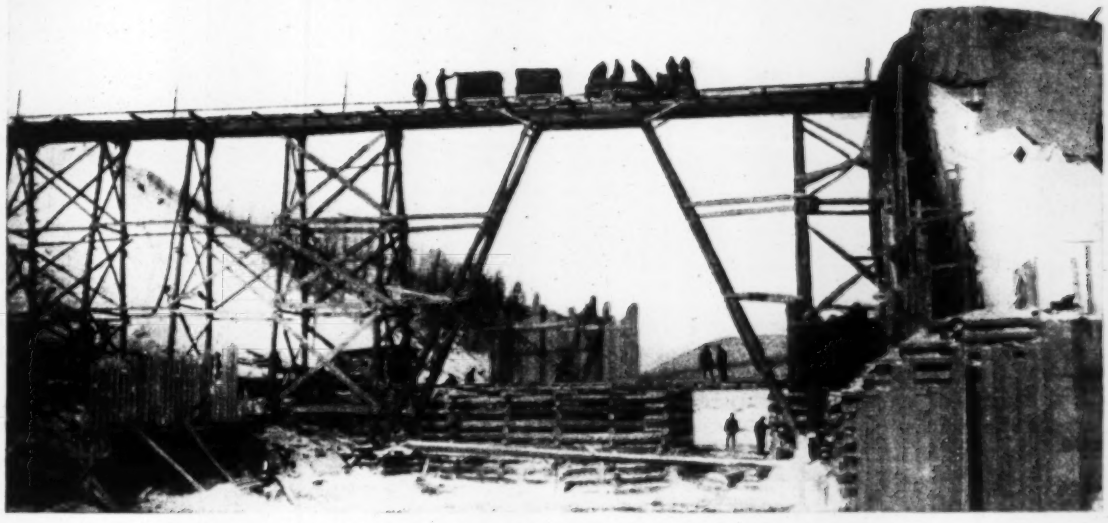


Fig. 2—Construction trestle with 60-ft. hogsback over the river

A concrete train is shown on the trestle. At the right is the temporary housing around the gate house. The upstream cofferdam is here shown under construction with the opening left for the key section.

river discharge during the winter by diverting the whole flow of the river at that time from its natural course, through a 10-ft. sluiceway left between power house and dam. In this way, concreting the main spillway section situated in the old riverbed could be done before the spring flood; and when the flood came, its water could discharge through the two main sluice openings while work on the west end of the dam proceeded. Diversion of the river was to be effected by damming the main channel with a 30-ft. rock-filled timber-crib cofferdam, the gate-house structure having previously been built up sufficiently to withstand the pressure due to a rise in water level caused by this dam. The four openings in the gate-house were to be closed by timber stoplogs, thus acting as a cofferdam for the power-house area, the downstream end of which would be protected by the tailrace cofferdams. The cofferdam layout, on which the whole construction schedule hinged, is shown in Fig. 4.

Many computations were made to determine water levels to be expected upstream and the flow in the 10-ft.-wide sluiceway, as a result of which no hitch occurred in carrying out the plan. No cofferdam was flooded until

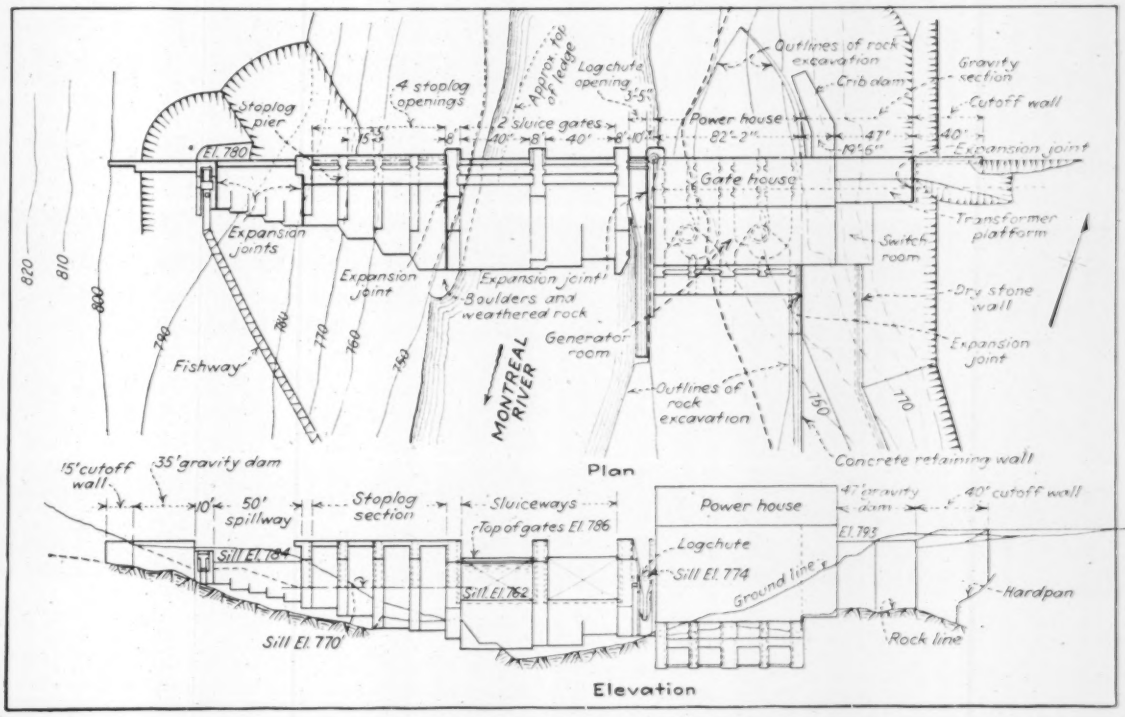


Fig. 3—Plan and elevation of Upper Notch plant

the summer of 1930, when an exceptional flood, occurring some time after the main spring flood, demolished part of the tailrace cofferdam. As the excavation behind this dam was then complete, this saved the job a considerable amount of expense and did no damage.

The quantities of material involved in the undertaking were not large, but in order to keep labor charges at a minimum, also to use up available equipment, the plant layout was designed on a larger scale than the amounts of materials to be handled would ordinarily require.

Climatic Conditions—Climatic conditions experienced on the job were typical of the northern part of Canada, the summers being fairly hot and the winter equally cold. Temperatures ranged from 98 to —40 deg. F. The temperature during three of the winter months never rose above freezing point. Eight feet of snow fell during the winter of 1929-1930 and remained on the ground for about six months. Rainfall was not, as a rule, heavy, but in June, 1930, during the exceptional storm previously noted, a fall of 5 in. occurred in 27 hours following a week of steady rain. The flood that resulted was one of the worst ever known on the Montreal River.

Construction Operations—Earth excavation, in the main, was sluiced into the river, boulders being handled by derricks and used as fill for cribs and as a source of crushed stone. After some experimenting it was found that the most efficient method of sluicing earth was to cut the bank by means of a high-pressure jet from a fire-hose nozzle, washing the loosened earth away with the discharge from a low-head 10-in. pump. Baffle boards, leading to a line of metal chutes, were kept as near to the working face as possible. Near the end of the job, some accumulation of this sluiced material in the river below the dam was washed away by opening both sluicegates under normal operating level and so discharging 30,000 sec.ft. down the river.

Rock excavation was mucked by hand and handled by derricks, one 5-ton stiff-leg and one 5-ton guy derrick on the east bank, and by a traveling stiff-leg derrick with a 65-ft. boom on the west bank. All derricks were built on the job. Rock from power house and tailrace excavation was dumped by the derrick onto a platform leading to two jaw crushers, which discharged into a 75-ft. bucket elevator discharging in turn onto a 16-in. belt conveyor 150 ft. long, supported on trestles, which delivered the crushed rock to the main stockpile. Sand of an excellent quality was discovered upstream of the dam. It was transported to the storage pile by autotruck, both sand and rock being piled, and it was deposited in the bins of the concrete plant by means of a 10-ton steel guy derrick with a 75-ft. boom.

Concrete—The arrangement of the concrete plant is shown in Fig. 6. The mixer had a capacity of 1 cu.yd., and the storage bins held a full day's supply to guard against any possible breakdown of the derrick. The mixer discharged into a 3-yd. dump hopper, which in turn discharged into the 2-yd. dump cars used for transporting the concrete to the dam and power house. Through the use of this dump hopper, two of these cars, hauled by a converted autotruck on a standard-gage track, were sufficient to take care of the full output of the mixer.

The concreting track was carried on a timber trestle

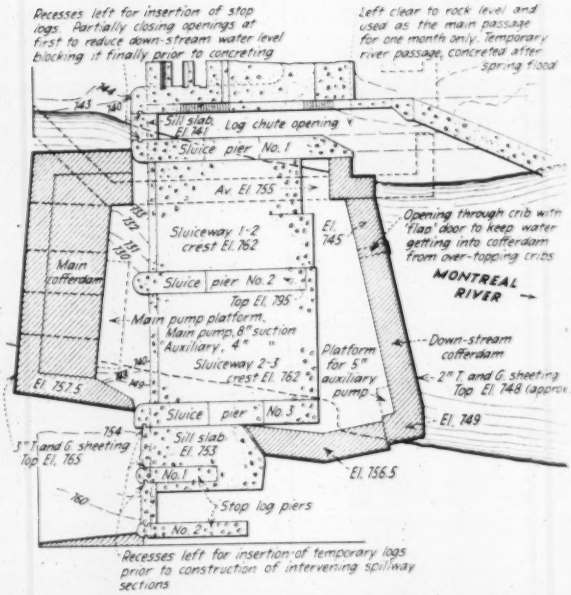

Recesses left for insertion of stop logs. Partially closing openings at first to reduce down-stream water level blocking it finally prior to concreting
Left clear to rock level and used as the main passage for one month only. Temporary river passage, concreted after spring flood
Sill slab El. 741
Log chute opening
Sluice pier No. 1
Av. El. 755
Sluiceway 1-2 crest El. 762
El. 745
Opening through crib with 'flap' door to keep water getting into cofferdam from over-topping cribs
Main cofferdam
Sluice pier No. 2
Top El. 795
Main pump platform
Main pump, 8" suction
Auxiliary, 4" "
Sluiceway 2-3 crest El. 762
Platform for 5" auxiliary pump
MONTREAL RIVER
Down-stream cofferdam
2" T. and G. sheeting Top El. 748 (approx.)
El. 757.5
Sluice pier No. 3
El. 749
3" T. and G. sheeting Top El. 765
Sill slab El. 753
No. 1
El. 756.5
Stop log piers
No. 2
Recesses left for insertion of temporary logs prior to construction of intervening spillway sections

Fig. 4—Arrangement of cofferdams and bypass channel

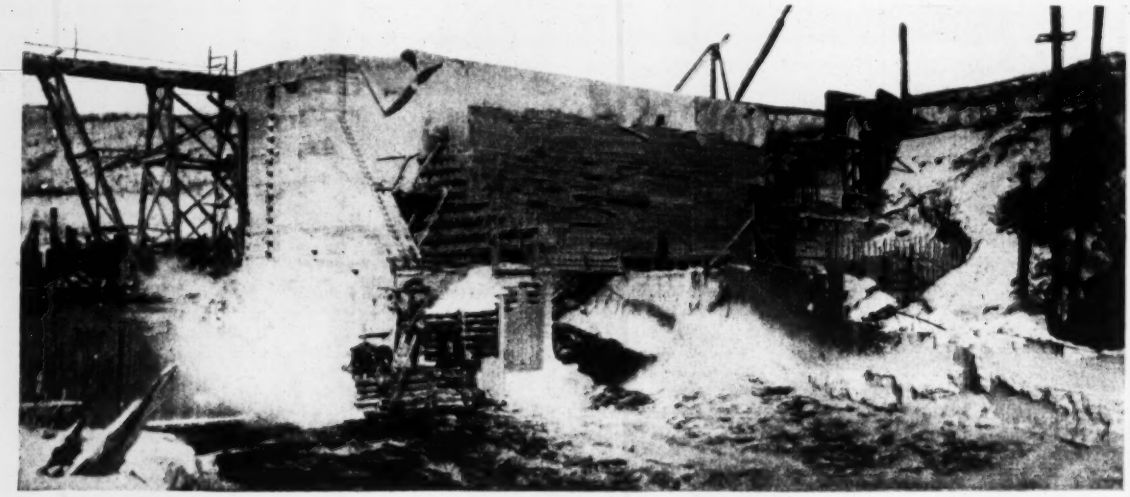


Fig. 5—Completing the downstream cofferdam

A diver using steam jets placed the sheeting along the downstream face. The stream at this time was carried through the 10-ft. sluiceway shown near the center. At the right is the ice-covered cofferdam of the tailrace. Above is the housing for the gate house, and in the upper right the sheetpiling for the cutoff wall.

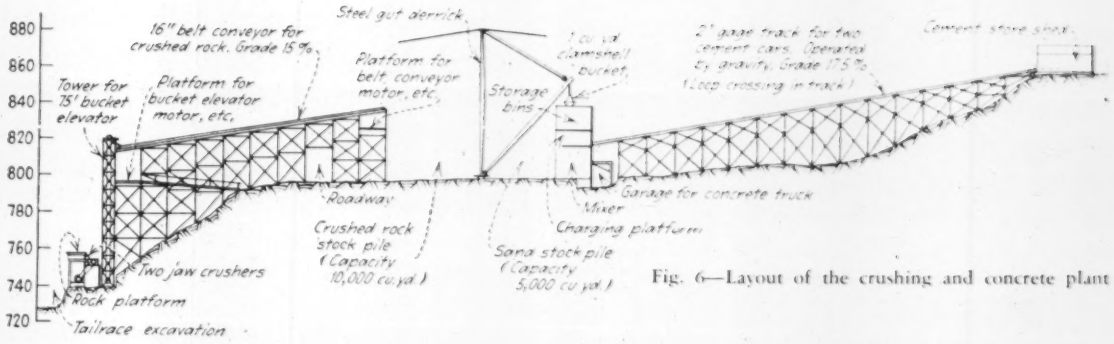


Fig. 6—Layout of the crushing and concrete plant

bridge, the center of the track being 11 ft. above the face line of the dam and 4 ft. above the designed top concrete level. These clearances were found to be very serviceable. With this arrangment, on one occasion, 449 cu.yd. of concrete was placed in forms 500 ft. from the plant in fifteen working hours, including time for starting and cleaning up. Each batch was mixed for at least 1¼ min. The average rate of concreting, at the end of the job, was 25 cu.yd. per hour. Cement was delivered to the concrete plant on a funicular railway, carried on a timber trestle at a grade of 17.5 per cent. This grade proved to be slightly steeper than was required for funicular action of the two trucks used.

Concrete was deposited by means of elephant trunks and chutes, being dumped from cars on the working trestle into low movable hoppers, to which the trunks were connected. In this way it proved possible, in general, to place concrete ideally dry, men tramping the concrete into position. The use of trunks, extending to the level of the concrete being placed, prevented the segregation of the aggregate. The only trouble encountered was in emptying the dump cars quickly, the concrete frequently having to be shoveled out.

Average cement content was 5.24 bags of cement per cubic yard, the average of all concrete tests made on the job being 2,675 lb. per sq.in. Slump tests, with few exceptions, gave slumps of less than 2 in., the water content being kept close to 5 gal. per sack of cement.

Seventy-five per cent of the total volume of concrete was placed in freezing weather, using methods now generally standardized for such work. Sand and rock were heated, the exhaust from the steam coils used for this being used to heat the mixing water. Before use the dump cars were heated with hot water. All foundations and construction joints were thoroughly washed with steam and hot water and kept wet and warm until the placing of the first concrete. All main forms were housed in light shelters built as timber frames covered with tar paper, the intervening air space being heated by means of coke salamanders. No anti-freeze compounds were used, and no concrete that was placed throughout the job froze.

The concrete-plant installation proved to be economical, the total job-labor charge being reduced to 25 per cent of the actual construction expenditure.

The greater part of the earth excavation was finished before the freeze-up of the winter set in, rock excavation proceeding steadily at the same time and right through the winter. The main part of the dam concrete was placed in the early months of 1930, and the west end was completed during that summer. Concreting of the powerhouse substructure commenced in February, 1930, and was finished at the beginning of June. The erection of the superstructure and installation of equipment followed

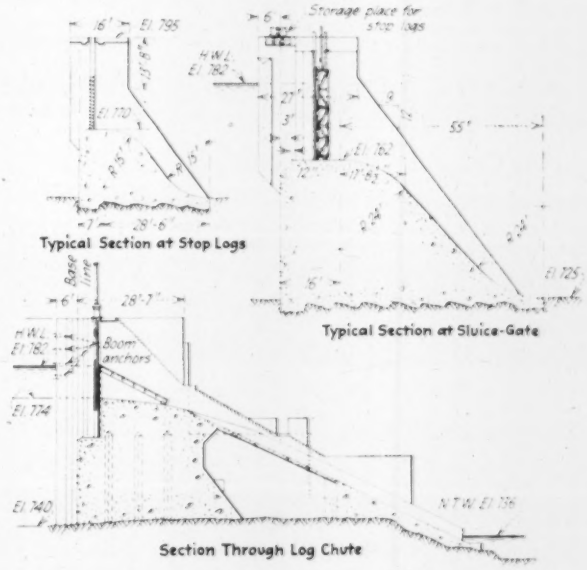


Fig. 7—Typical sections of the dam

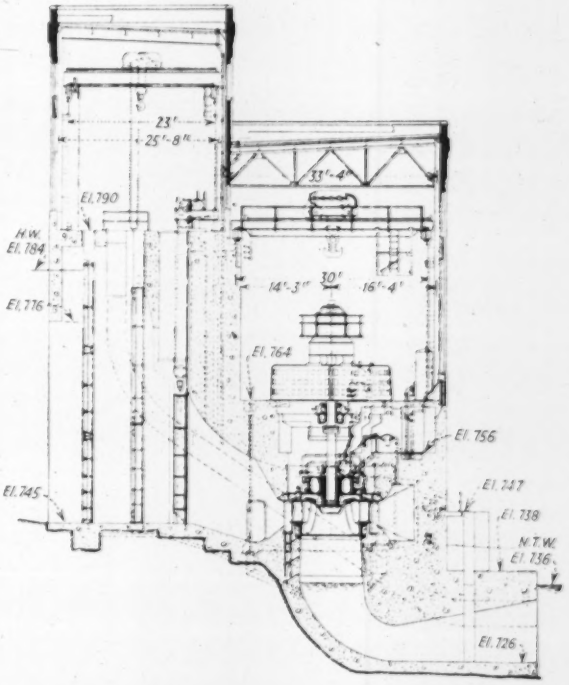


Fig. 8—Section through the power plant

The main gates are designed for remote-control operation.

immediately. Owing to the automatic nature of the plant, involving the laying of 2¼ miles of conduit in the power-house floor, etc., this latter work took longer than usual, but the first unit was turned over (running light) on Aug. 25, 1930.

Cofferdams—The general cofferdam scheme has already been outlined. The smaller cofferdams were built of flatted logs (prepared and sold as railroad ties) in 8- and 16-ft. lengths. This uniformity greatly aided construction. The cribs were 8 or 10 ft. wide, filled with rock and sheeted with 2-in. tongue-and-groove boards. The main upstream cofferdam was built up of spruce logs, felled in the woods above the dam and spiked with ¾-in. spikes, in four sections, 30 ft. high and 30 ft. long. The second and third cribs were built upside down and launched by overturning. With three cribs in place, 3-in. tongue-and-groove sheeting for the outer face was secured over as large an area as possible, using divers working with steam jets to free the ice.

Meanwhile the key crib was built up over the opening still left in the dam, secured at each corner by slings of ¾-in. cables. This key crib was built up as a plain rectangular section and was held in position during lowering by two 1¼-in. special steel cables. A better design would have been to have made the crib T-shaped, the wings of the T bearing on rails fixed to recesses in the two adjacent cribs.

The rise in water level to be expected when the key crib was lowered was calculated before that operation started. The main danger was that of ice floating down on the dam, having been broken off by the rise in water level. To minimize this, gangs of men were set to work on each bank of the river blasting loose as much shore ice as possible. Even so, a great deal of ice did float down on to the dam, but it was held up by ropes stretched across the river. However, the weather was so cold that in two days this ice had consolidated into a solid pack, which was used as a working area for finishing up the cofferdam. Lowering the key crib took the better part of a day. Sheeting started as soon as it was filled, and the downstream cofferdam was completed simultaneously.

The river, meantime, flowed through the 10-ft.-wide log chute opening, the depth on the sill reaching 20 ft. at times.

A block of concrete used to divert the flow from the tailrace cofferdam was placed at a temperature of —40 deg. F.; and although buffeted for over six months, it showed no signs of damage or wear at the end of this period. Further, before the bypass opening was used, a pocket in the rock surface was filled with 2 yd. of lean concrete dumped in freezing weather and allowed to freeze. The top of this was level with the bottom of the opening; at the end of the summer it was found to be in splendid condition, with no signs of having been frozen.

As indicative of weather conditions during the main cofferdam operations, it may be mentioned that, although the velocity in the 10-ft. sluiceway was generally about 16 ft. per second, a solid layer of ice formed over the entire water surface.

Builders—The whole project, including the 32.7-mile transmission line, was designed and constructed by the Power Corporation of Canada, Ltd., of Montreal. The total cost was approximately $1,500,000. The authors of this article were construction superintendent and resident engineer, respectively.

Fig. 9—Remote-control crest gates opened for 16,000 sec.-ft., flood of June, 1930

Fig. 10—Completed Upper Notch dam and power plant

The 50-ft. overflow spillway is in the foreground; beyond are the four stoplog openings, manually controlled; and beyond them the two 40-ft. crest gates for remote control.

Tidal River Tunnel Completed in India

The Calcutta Electric Supply Corp. has just completed a cable tunnel under the River Hooghly in India, which is the first iron-lined tunnel ever constructed under a large tidal river in the East by compressed air. The idea of the tunnel was to carry cables for the supply of electricity to the important residential and industrial area in the south of Howrah on the right bank of the Hooghly, the only alternative being the construction of a new expensive duplicate generating station. The crown of the tunnel is 36 ft. below the bed at the deepest part of the river and 15 ft. below the deepest known scour. Air pressure varied from 25 to 46 lb. per sq.in. and at times had to be such as to balance the tidal head in the river. The consulting engineer for the scheme was Harley H. Dalrymple Hay, and the contractor was the British firm of John Cochrane & Sons, who started work on the project in December, 1929.

The Water-Sewage-Water Cycle—Discussion

Being the views of Western and Middle Western engineers and sanitarians on the practice, referring to its objections and its future

THERE are in this country, as in the Ruhr Basin in Germany, several places where the treated sewage of one town has become the water supply of other municipalities downstream. Sewage contamination of streams used for water supply, the degree to which the contamination may be removed and the numerous problems surrounding the procedure have recently been brought into bold relief by several published statements on the subject. R. F. Goudey started the discussion by a report (*ENR*, March 12, 1931, p. 883) of his investigations at Los Angeles. Dr. Karl Imhoff then told of his laboratory research into the number of times the water-sewage-water cycle might with safety be gone through (*ENR*, May 28, 1931, p. 883), and his conclusion that after ten cycles the salinity had reached the tolerance point.

In the acompanying articles, N. T. Veatch, Jr., tells of the highly concentrated use of the Verdigris River in Kansas; Miss Jane H. Rider speaks of experience in Arizona, where water is essentially a "precious metal"; Burton Lowther expresses the opinion that adverse sentiment may be overcome after commercial and irrigation uses have become familiar, and H. W. Streeter gives the official public attitude, which he feels will always be against domestic use of treated sewage as being too repugnant for consideration.

All in all one must recognize that the hydrogen and oxygen atoms making water are sovereign pure elements and cannot be contaminated in the molecule by being associated with organic or other wastes. If the latter are removed as they have been eliminated by nature for countless ages the elemental water is just as efficacious for human use regardless of previous contaminating associations. —EDITOR.

* * *

Re-use of Water in Desert Country

By JANE H. RIDER
Director, State Laboratory, Tucson, Ariz.

IN THE article in *Engineering News-Record* of March 12, "Plans for Sewage Reclamation in the Los Angeles Metropolitan Area," R. F. Goudey states: "Man has never yet conquered the desert, nor will he as long as the used waters of the communities of the arid sections are permitted to be wasted. Water, the most important natural resource of the desert country, should be used and re-used until it absorbs too great a percentage of salts for irrigation or industrial purposes." That the conquest is under way is evident in Arizona.

The Salt River Valley Water Users Association, Phoenix, has practiced the re-use of irrigation water for a number of years. The impounded water from a series of dams is applied to the land, filters through the subsoil, is pumped to the surface, and is again used for irrigation. In passing through the soil the water absorbs enough soluble salts to increase its alkalinity materially; it may still be used for crops, except in certain sections, where it must be diluted with the impounded surface water. This absorption of soluble salts will naturally limit the number of times this water can be used for agricultural purposes. The effluent from sewage-disposal plants when applied to the land in Arizona is subject to the same limitations.

Sewage-treatment plants in Arizona, using land disposal, all have sedimentation without any secondary treatment. We have made no investigation except at the Tucson plant, which has mechanical clarification with separate sludge digestion, the clarified effluent being used to irrigate 350 acres of land. Here we are studying the possibilities of the upper flow of groundwater being contaminated by the repeated application of this highly polluted liquid.

The city of Tucson has drilled a test well on a farm a mile downstream from the last area irrigated with effluent. This well has a tight joint casing to the first water, the casing extending 6 ft. above ground to prevent floods or surface runoff from getting into the well. It is equipped with an ordinary hand pump for sampling. Before starting the tests the casing and pump were sterilized with a solution of chloride of lime.

From Jan. 30 to May 18 bacterial examinations were made of 30 samples from the well with the following results:

Total counts varied from 100 to 79,000 bacteria per c.c.
Average count was 7,000 bacteria per c.c.
46.6 per cent of the samples showed B. coli in 0.1 c.c.
16.6 per cent of the samples showed B. coli in 0.01 c.c.

Water taken from the same level in properly protected wells above the city farm does not show contamination. Chemical data are not available.

For a period water overflowed from the fields into the dry channel of the Santa Cruz River, which passes within 150 ft. of the test well. Eleven examinations made of this water from Feb. 24 to March 25 gave the following results:

Total counts varied from 1,200 to 1,400,000 bacteria per c.c.
Average total count was 430,000 bacteria per c.c.
63.6 per cent of the samples had B. coli in 0.1 c.c.
54.5 per cent of the samples had B. coli in 0.01 c.c.
All samples in both groups had B. coli in the 1 c.c. and 10 c.c. portions.

We felt that the effluent in the dry river channel so close to the well might have influenced the results, so we requested the farm superintendent to keep this water out of the river bed. The contamination appears to be materially less in the well when the effluent is not flowing in the channel. Our preliminary results indicate that, with moderately tight soil, primary treatment of sewage will not prevent pollution of the upper groundwater in the vicinity of the irrigated land.

Preliminary treatment of the sewage at Tucson costs $3.42 per million gallons; groundwater pumped to the surface for irrigation costs about $20 per million gallons. No gravity flow is available in this district for irrigation. The crops grown on the city farm are usually better than those on the surrounding farms, showing the probable benefit of the nitrogeneous organic matter in the sewage.

Grand Canyon, Ariz., brings in potable water 100 miles in tank cars at a cost of $3.09 per 1,000 gal. As a matter of economy and to dispose of the liquid wastes without causing any annoyance to the tourists visiting Grand Canyon an activated-sludge plant with rapid sand filters and chlorinators was constructed at a cost of $97,000 to treat 79,000 gal. of sewage per day. This plant produces a clear, stable effluent for an average cost of 57c. per 1,000 gal. This water is bacterially safe and chemically suitable for boilers, cooling, irrigation and other industrial purposes. The saving over the cost of fresh water is obvious.

Reclaiming sewage for industrial and irrigation purposes is a problem that concerns not only the engineers interested in water supplies and sewage treatment but the officials charged with the management of municipalities. In the arid sections community development is definitely limited by the availability of water supplies; to waste so valuable a resource by not preparing the spent waters for re-use must be considered civic folly and extravagance. Engineers practicing this phase of sanitation will be keenly interested in the scientific and economic results of Mr. Goudey's experiments at Los Angeles, but who is to overcome the natural prejudices of the public against using reclaimed water?

* * *

Economies of Commercial Use

By BURTON LOWTHER
Consulting Hydraulic and Sanitary Engineer, Denver, Colo.

REFERRING to the water-sewage-water articles by R. F. Goudey and Dr. Karl Imhoff, the writer wishes to express the view that the return of sewage water after proper treatment direct to the public water supply differs only in degree from using a highly polluted surface supply, as many cities are now doing without any unusual criticism from the public or from the public health authorities. The use of the Hudson River by cities situated along its banks above the influence of tidewater is a good example of the use of a river highly polluted by human wastes. One of these cities, now taking its supply from the foothill region of the Catskills, used for many years Hudson River water containing at times 1,000,000 bacteria per cubic centimeter and more. This, too, was in the days before the present refinements of water purification were thought of.

The question of esthetics will undoubtedly affect the attitude of the public for some time to come in the matter of the use of returned sewage water for domestic purposes, notwithstanding the fact that no "esthetic deficiency" can be discovered in such a water. It is a rather safe prediction to say that adverse public sentiment to such a source of supply will be gradually overcome, just as the early prejudice against the use of chemicals in the treatment of domestic water supplies was dissipated. It is not a question of producing a safe and pallatable water—that is an established fact—but rather of persuading the public to accept the product even after the economic soundness of the method has been fully proved.

Since it is known that the sodium-chloride content is at least one of the limiting factors in the number of cycles, the strength of the sewage as well as the salt content of the original source of supply must be taken into consideration in studying the economics of the local problem. Groundwater supplies subject to the intrusion of saline waters caused by heavy demands on the ground sheet will be an important economic consideration. Surface supplies, such as are found in the lower reaches of the Colorado River and streams of Nevada and Arizona, and others of the Southwest with an original high salt content will require special study in connection with fecal and industrial waste salt content.

Full treatment will require a close coordination between the management of the water department and the management of the sewage department in order that safety, economy and satisfactory results may be obtained at all times. Better still would be a consolidation of these two departments under a single individual, with his staff responsible for the performance of both plants.

The greatest value of a purified sewage effluent will probably be realized in the semi-arid West. Irrigation of truck farms, commercial and semi-sanitary uses in time will accustom the public to consider the economic value of such water. Such use will be a weighty factor in obtaining the favor of the public toward the higher use as a part of domestic water supplies. A return of the completely treated sewage effluent to the soil through natural or artificial sand or gravel beds to restore the groundwater to wells or infiltration galleries would probably meet with the least opposition from the public at this time.

Much yet remains to be learned regarding the physical, chemical and biochemical products to be dealt with in the various types of sewage, and as to just how these various basic elements will respond to treatment in the final effluent. Each individual problem will require considerable investigation and research. The problem should be faced squarely by sanitarians, realizing that whatever is commercially sound and profitable will eventually be put to use.

Sanitary science is deeply indebted to Mr. Goudey and others who are pioneering in this field of investigation. The data already gathered are highly encouraging; the writer hopes that the researches will continue.

* * *

Absolute Necessity the Only Justification

By N. T. VEATCH, JR.
Consulting Engineer, Kansas City, Mo.

IT IS probably safe to assume that the use of the water-sewage-water cycle, if ever practiced in this country, will be practiced for only two reasons—namely, absolute necessity and engineering economics. The re-use of water is not an entirely new thought in the Middle West, for there have been a number of streams furnishing water supplies to cities the total demands of which exceeded many times the flow of the stream. The Verdigris River in Kansas a number of years ago during an extremely dry season furnished water supplies to a number of cities in Kansas, which used fifteen to twenty times the flow of the river at the Kansas-Oklahoma state line. All of the cities along the stream had sewage and water-purification plants. Since a certain amount of make-up water came from the underground gravel reservoirs, the number of cycles could not be ascertained. In this case the cycle schedule was a definite necessity regardless of the salinity or any other index, aside from that bearing on public health.

When a shortage of water for industrial and irrigation purposes exists, it seems logical to assume that treated sewage will be used for these purposes.

The cost of treating sewage for irrigation purposes

(activated-sludge method) is approximately 5c. per 1,000 gal. The purified water is especially adapted for irrigation, as it contains enough nitrogen to make it useful as a fertilizer. Mr. Goudey at Los Angeles claims that it has enough nitrogen to meet two-thirds of the requirements of the most expensive crops. At Urbana, Ill., the effluent contained 19 p.p.m. of nitrates whereas the average of seven other plants is 10 p.p.m. It is probable that when used for irrigation the water should be conducted in an inclosed system to keep down the growths that would thrive in an open-ditch system. For some industrial uses probably little more treatment than that required for irrigation would be necessary, and for some waters any treatment would probably be prohibitive.

In a number of instances, as at Los Angeles, it would be far cheaper to purify sewage than to obtain additional water supply. In many cases it would undoubtedly be easier to trade treated sewage for irrigation water than to plan on obtaining additional water supply direct from the purified sewage. That is to say, where fresh water is being used for irrigation and industrial uses this quantity could be added to the domestic water supply and the treated sewage substituted.

Sewage is ordinarily well over 99 per cent water, and with the modern means of sewage and water purification there is no reason why the water-sewage-water cycle should not be employed wherever necessary. The likelihood, however, of its being used for the direct purpose of replenishing water supplies will come only where there is a definite necessity and where the engineering economics involved are not controlling. I know of a number of cities using water supplies with a salinity considerably above that suggested by many sanitarians as a limit and considerably above the 250 p.p.m. set by the American Water Works Association.

Experiences at the Grand Canyon plant illustrate how thoroughly sewage can be treated. This plant, designed to handle a sewage flow of 200,000 gal. per day, demonstrates that 99.99 per cent of the B. coli can be removed by such treatment at a cost of 57.4c. per 1,000 gal. While the purified water meets the United States treasury standard of drinking water, it is used only for lawn sprinkling, boilers, cooling water for oil engines and the flushing of toilets. As all the water used in Grand Canyon must be hauled in at a cost of $3.09 per 1,000 gal., a considerable saving is effected in the total cost of water consumed. This is a good example of the use of the water-sewage-water cycle, caused by engineering economics. One interesting feature is that the re-treatment softens the water.

Public sentiment will probably preclude the use of the cycle, unless it is absolutely necessary or economically desirable.

* * *

Only for Isolated Cases

By H. W. STREETER

Sanitary Engineer, Stream Pollution Investigations, U. S. Public Health Service, Cincinnati, Ohio

MR. IMHOFF'S article on "The Possibilities and Limits of the Water-Sewage-Water Cycle" brings forcefully to our attention the situations that may arise where the demand for water exceeds the available fresh supply.

In so far as this country is concerned it hardly seems likely that an intensification of the cycle to a degree comparable with that now existing in the Ruhr district will be either practicable or necessary, except possibly in limited areas, in view of the conditions of our climate, the relative scarcity of extensive porous underground water strata to serve as a link in the cycle, and the availability of abundant sources of water supply in our large rivers and the Great Lakes. All of these circumstances combined would seem to impose a restriction on such a repeated cycle and also to make it largely unnecessary.

The interesting experiments at Los Angeles, described by Mr. Goudey in the March 21 issue, and the sewage reclamation plant recently installed at the Grand Canyon have afforded demonstrations of the possibilities which exist for converting ordinary sewage into a clear water, low in bacterial and organic content. Water of such character is being used without objection at Grand Canyon for irrigation, flushing and locomotive boilers, but not for drinking or culinary purposes. At Los Angeles, it is understood, reclaimed sewage of the same general character is proposed for irrigation and for reinforcing the underground water supply of the district. In Florida raw sewage is discharged into the porous sand and gravel deposits through drainage wells without causing any measurable pollution of the water supplies derived from these deposits at other points. Where the natural purifying capacity of porous underground strata is available, it affords a strong link in the cycle. Dr. Imhoff's description shows it a powerful factor in the Ruhr situation.

In large areas of the United States open surface bodies of water, rather than porous underground reservoirs, must constitute the corresponding link in such a cycle. Under these circumstances an intensification of the cycle involving the discharge of highly nitrified reclaimed sewage into surface streams and lakes probably would be attended by difficulties for which no precedent exists, either at Los Angeles or in the Ruhr district. Among such difficulties under the conditions of climate and summer regimen of streams prevalent in the United States excessive growths of microscopic organisms probably would present a serious problem. Organic substances in high concentration, some of them possibly toxic, would introduce another element of uncertainty. Under conditions of large-scale operation, bacterial pollution would be an ever-present source of danger owing to the limited natural purification capacity of open watercourses and the relatively long periods of time required for purification to become effective.

If it were assumed, however, that in the face of those difficulties a highly intensified cycle of sewage reclamation and water purification could deliver a final effluent of acceptable safety and palatability, it is very doubtful whether a large majority of the population would tolerate, except under extreme necessity, the continued use of such water for drinking and culinary purposes, once the physical conditions surrounding its production became generally known. The repugnance of all animals, both human and otherwise, toward the waste products of their own metabolism is inherent and deep seated.

For all practical purposes an intensified and repeated water-sewage-water cycle may be considered, therefore, as being limited, in so far as this country is concerned, to the reclamation of water for uses other than domestic, such as irrigation, flushing and certain industrial purposes. Any extension of the cycle, for domestic water supplies, beyond those limits that present experience and observation indicate as being tolerable would seem to be unlikely, except possibly in special cases such as exist at Los Angeles and in the Ruhr district.

T-Flange Girders for Heavy Service

A new form of construction by which the depth of heavy plate girders can be reduced

By W. H. WEISKOPF and J. W. PICKWORTH
Consulting Engineers, New York City

IN DESIGNING a heavy trucking viaduct to be erected in Pittsburgh, Pa., the writers are making use of a new type of plate girder. To carry a roadway over railroad tracks, the design requires fourteen plate girders of about 7-ft. depth, varying from 70 to 96 ft. in length, with clear spans of 60½ to 74½ ft. and loaded overhangs 10 to 20 ft. long. They afford an excellent opportunity to use for the first time (to the writer's knowledge) a new departure in plate-girder design, the advantage of which in this case is economy and simplicity of construction. In other applications it is capable of developing a larger flange section than the conventional girder, and thereby permits of a saving in girder depth.

In the heavy girder work that has become increasingly common in buildings the deepest girder usually fixes the amount of waste space between ceiling and floor, and hence the waste height of the building. The engineer must then develop the greatest girder strength in minimum depth. Many such cases in the authors' practice led them to devise as a solution of the problem the new form, which they have called the *WP* girder.

Wide-flange beams successfully meet the demand for minimum depth in the range of smaller capacities, but in heavy built-up girders a limit to depth reduction is set by the strength of the connection between flange angles and web. In the *WP* girder the strength capacity of this connection is greatly increased by providing a flange with three vertical stem portions for connection to two or four web plates. This is accomplished by using for each flange a T-section (which may be obtained commercially today by cutting a rolled beam or column section) combined with two angles.

Greater Web Rivet Capacity—In Fig. 2, where various forms of this new construction are shown, the web rivets are in four shears in *A* and *B*, and in six shears in *C*, as compared to rivets in two or four shears in the conventional girder. Also, in addition to the customary double row of rivets connecting flange to web, additional rivet lines are available to connect the long center stem of the flange to the webs (*B* and *D*). Care should be taken in designing to specify a center stem of sufficient thickness, especially where these additional rivet lines are required. Because of the large web-rivet capacity and because so much flange material is directly connected to the web, a larger girder flange can be used than is practicable in the conventional type.

The new girder can be used to advantage where a clear flange without rivet heads is desired (*E* in Fig. 2). It is particularly useful where vertical load is to be transmitted from flange to web of girder, as in grillage girders, where extra lines of rivets in the lower flange aid in transmitting the vertical load to the concrete. Here also the clear flanges are of value in facilitating grouting under the girders and in doing away with the countersinking and chipping of rivets in the upper flange under the billet. In the railroad girder extra rivets in the upper flange aid in carrying the wheel loads into the

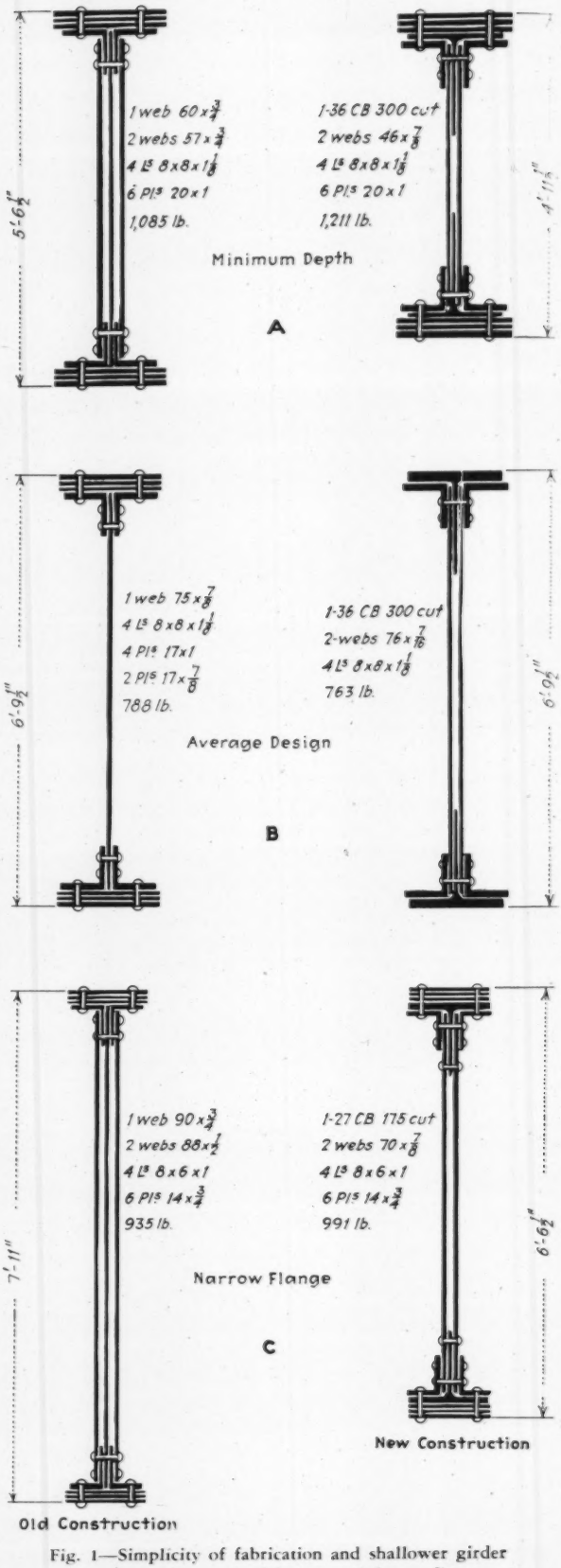

1 web 60 x 3/4
2 webs 57 x 3/4
4 L's 8 x 8 x 1 1/8
6 Pl's 20 x 1
1,085 lb.
1-36 CB 300 cut
2 webs 46 x 7/8
4 L's 8 x 8 x 1 1/8
6 Pl's 20 x 1
1,211 lb.
Minimum Depth
A
1 web 75 x 7/8
4 L's 8 x 8 x 1 1/8
4 Pl's 17 x 1
2 Pl's 17 x 7/8
788 lb.
1-36 CB 300 cut
2-webs 76 x 7/16
4 L's 8 x 8 x 1 1/8
763 lb.
Average Design
B
1 web 90 x 3/4
2 webs 88 x 1/2
4 L's 8 x 6 x 1
6 Pl's 14 x 3/4
935 lb.
1-27 CB 175 cut
2 webs 70 x 7/8
4 L's 8 x 6 x 1
6 Pl's 14 x 3/4
991 lb.
Narrow Flange
C
New Construction
Old Construction

Fig. 1—Simplicity of fabrication and shallower girder depth may be attained by new girder made up

web, while the tie-bearing face remains free of rivet heads and steps due to coverplates.

Specific Comparisons—Fig. 1 shows several girders designed for a load of 666 tons in the center of a 24-ft. span. Where minimum depth of girder is a requirement, the new girder can be made much shallower, *using the same coverplates*. Where only average conditions are imposed, the new girder resists the same large moment of 4,000 ft.-tons without requiring coverplates. Where a narrow flange is essential, the new girder can be made shallower. These are typical comparisons.

Table of Sizes—The great variety of shapes rolled provides a wide range from which to select girder flanges. A wide or a narrow flange and a long or short T-stem can be obtained by selecting the proper beam or column section to cut. Below are three tables of girder flanges. The obtainable range for plain flanges without coverplates is worth noting: using a cut column, without going into a web thickness greater than that which can be punched, a flange area of 50.6 sq.in. can be obtained, while with the cut beam an area up to 72.8 sq.in. is available. This flange is equivalent to an old-type flange of two angles 8x8x1⅛ in. and coverplates 18x2¾ in., which obviously exceeds that of the great majority of fabricated girders. Except where required to place the web rivets in multiple shear, the angles need not run full length but can be stopped as the bending moment falls off.

Properties of coverplated flanges of various widths from 10 to 20 in. are also given. These tables, while incomplete for design purposes, give an idea of the range of flanges obtainable.

Summary—In brief, the new girder form gives: (1) Great rivet capacity between flange and web; and (2) a large amount of flange material directly connected to the web. Through these two features it is particularly applicable to cases requiring minimum depth, a clear flange, or transmission of load from flange to web. In the general case of the fabricated girder it eliminates a large amount of riveting.

As the authors believe the new form to be a basic improvement in girder constructions, they have applied for patents on it.

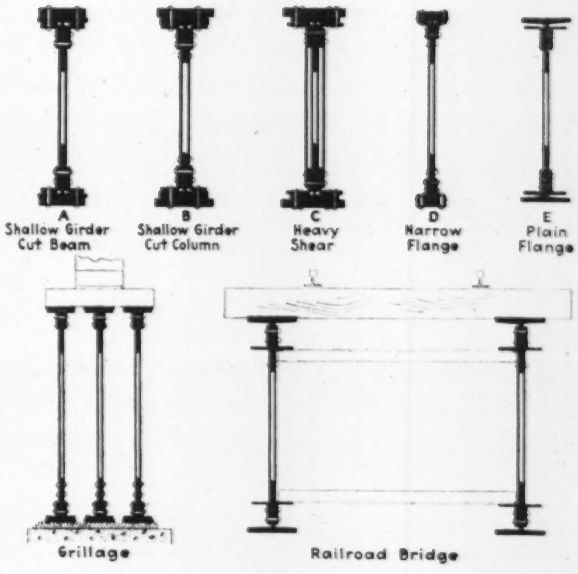
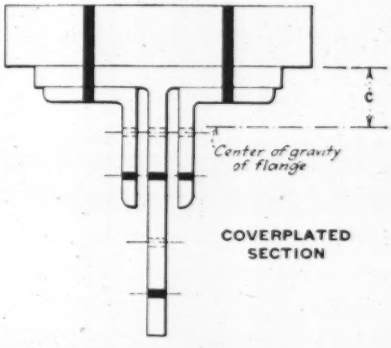


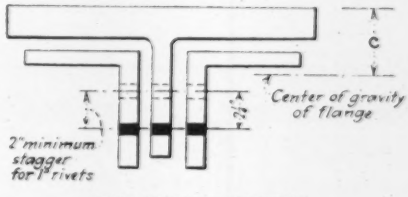
Fig. 2—Girders using cut beams or columns as main flange element may be of various forms according to use. In grillage and deck railroad bridge service the absence of coverplates is a special advantage

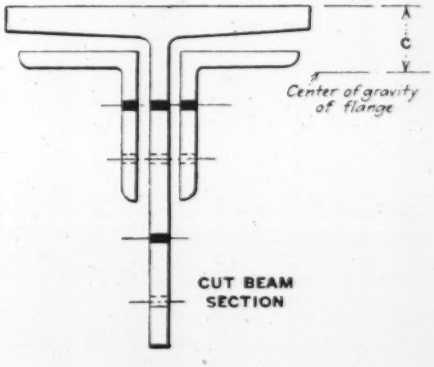
SECTIONS WITH COVERPLATES

Section cut	36 x 300		36 x 300		33 x 260		30 x 240		27 x 175		36 x 192		30 x 131	
Angles	8 x 8 x 1⅛		8 x 6 x 1		8 x 6 x 1		8 x 6 x 1		8 x 6 x 1		6 x 4 x 1		6 x 4 x 1	
Coverplate, width, in.	20		17		16		15		14		12		10	
Flange width, in.	20		17		16		15⅛		14⅛		12⅛		10⅛	
Thickness of cover...	Area, Sq.In.	C_y In.	Area, Sq.In.	C_y In.	Area, Sq.In.	C_y In.	Area, Sq.In.	C_y In.	Area, Sq.In.	C_y In.	Area, Sq.In.	C_y In.	Area, Sq.In.	C_y In.
1	84.2	3.2	74.4	3.4	68.0	3.1	64.1	2.9	54.7	2.5	46.8	3.2	36.8	2.5
1⅛	88.7	3.0	78.0	3.2	71.4	2.9	67.2	2.7	57.6	2.4	49.3	3.0	38.8	2.4
1¼	93.1	2.8	81.7	3.0	74.8	2.7	70.4	2.5	60.6	2.2	51.7	2.8	40.7	2.2
1⅜	97.6	2.6	85.4	2.8	78.3	2.5	73.6	2.4	63.5	2.0	54.2	2.6	42.7	2.0
2	102.0	2.4	89.1	2.6	81.7	2.3	76.8	2.2	66.4	1.9	56.6	2.5	44.6	1.8
2⅛	106.4	2.2	92.8	2.4	85.1	2.2	80.0	2.0	69.3	1.7	59.0	2.3	46.5	1.7
2¼	110.9	2.0	96.5	2.2	88.6	2.0	83.2	1.9	72.3	1.5	61.5	2.1	48.5	1.5
2⅜	115.3	1.8	100.2	2.0	92.0	1.8	86.4	1.7	75.2	1.3	63.9	1.9	50.4	1.4
3	119.7	1.7	103.9	1.8	95.5	1.6	89.6	1.5	78.1	1.2	66.3	1.7	52.3	1.2



SECTIONS USING CUT COLUMNS





SECTIONS USING CUT BEAMS

Section	Angles, In.	Area, Sq.In.	Distance c_y In.
20 x 115	7 x 3½ x ½	23.0	2.7
125	⅝	24.4	2.7
135	¾	26.7	2.8
146	⅞	29.5	2.9
24 x 150	⅞	30.5	3.1
160	1	32.8	3.2
28 x 166	8 x 6 x ½	35.3	3.3
175	⅝	38.0	3.4
30 x 190	¾	41.5	3.7
200	⅞	44.4	3.8
220	1	48.6	3.9
240	1⅛	52.8	4.0
33 x 260	1¼	57.1	4.2
36 x 280	1⅜	61.3	4.4
300	1½	65.5	4.5
300	8 x 8 x 1	69.6	4.4
3	1⅛	72.8	4.4

Section	Angles, In.	Area, Sq.In.	Distance c_y In.
14 in. x 87 lb.	6 x 4 x ½	18.6	1.8
95	⅝	19.8	1.8
103	¾	21.9	1.9
111	⅞	23.0	1.9
119	⅞	25.1	2.0
127	1	26.3	2.0
136	1⅛	28.6	2.1
145	1¼	30.7	2.2
153	1⅜	31.8	2.2
14 in. x 142 lb.	6 x 6 x ⅝	32.8	2.2
150	⅝	35.2	2.2
158	¾	37.5	2.3
167	¾	38.8	2.3
176	⅞	41.2	2.4
184	⅞	42.4	2.4
193	1	44.7	2.5
202	1	46.0	2.5
211	1⅛	48.3	2.5
219	1⅛	50.6	2.6

Jig Assembly for Welding Fabrication Proves Its Efficiency

FABRICATION of the steel for a new all-welded shop building at the Barberton, Ohio, plant of the Babcock & Wilcox Co., was assisted materially by the use of special jigs for assembling the crane runway columns and the roof trusses. The new building is 475 ft. long, one story high, with 33 ft. in the clear from floor line to bottom of roof trusses, and with a crane span of 75 ft. The company states that the plan finally worked out is probably not of the maximum efficiency, inasmuch as a considerable amount of steel already on hand had to be worked into the design. Nevertheless, results showed about a 10 per cent saving over the estimate for a riveted building. The company's own welding personnel was used.

Columns—Each of the 40 columns in the building consists of a main column made up of a 24-in., 105.9-lb. I-beam, 15 ft. 9 in. long, surmounted by a built-up stub column 8 ft. long, the latter composed of an 8x$\frac{1}{2}$-in. web plate, 30x38$\frac{1}{2}$x$\frac{1}{2}$-in. gusset plate at the top and four 4x3x$\frac{3}{8}$-in. angles, which are seam-welded to the web plate by $\frac{3}{8}$-in. fillets, 2 in. long on 6-in. centers. A $\frac{1}{2}$ in. bearing plate is welded to the uncovered portion of the upper end of the main column to provide a bracket upon which to place the ends of the crane girders. The details of the column are shown in Fig. 2.

The necessary structural sections for the columns were cut to size in the company's old structural fabricating shop at Barberton and sent to the welding shop for assembly. Two jigs were built to facilitate the work. One of these jigs was used to assemble the built-up stub column, and the other for the complete column assembly. The jigs consist of 14-in. *CB* sections, to the top flanges of which a number of short pieces of angles were spot-welded in advantageous positions to act as stops and clips. Angles with drilled holes were placed at points along the columns where bolt holes occurred. Thus, in assembling a column, it was simply

Fig. 1—New all-welded shop building of Babcock & Wilcox Co.
Fabrication of columns and roof trusses was materially assisted by use of jigs.

necessary to place the component parts properly in the jig, clamp them to the angle clips, drive pins through bolt holes in the columns matching with the drilled angles and then weld the component pieces of the column together. These jigs greatly simplified the process of layout and assembly.

The first few columns were welded completely while in the jigs, but the bulk of the columns were merely spot-welded in the jigs and then removed for finish welding.

Roof Trusses—The twenty trusses (80-ft. span and 16 ft. deep at center) are of the compound Fink type,

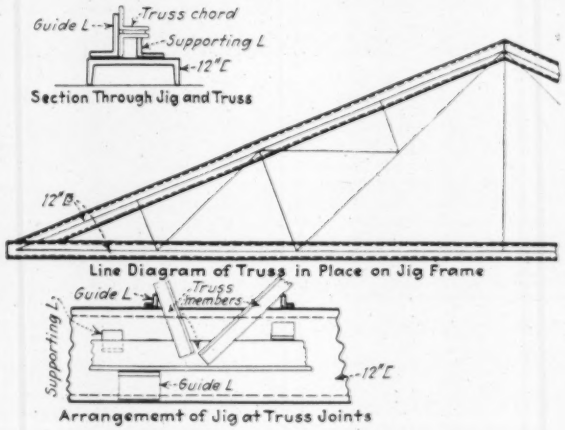


Fig. 3—Details of truss assembly in jig

all the members of which are double angles, back to back, with welded spacer bars and tiebars used freely to secure the pairs of angles together into rigid members. Gusset plates are employed only at the eaves,

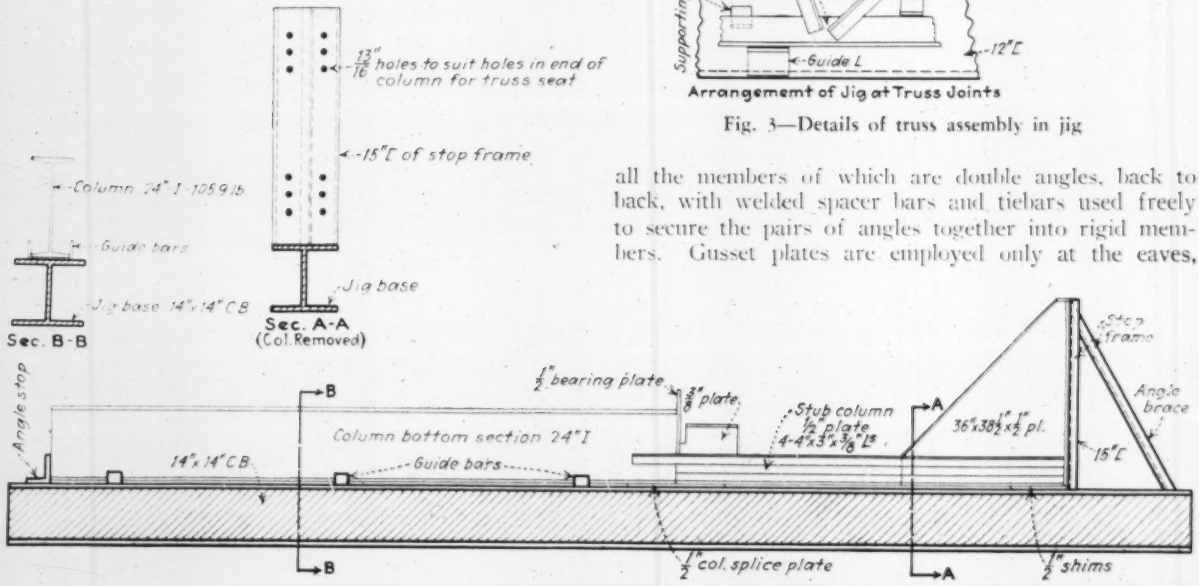


Fig. 2—Column jig with column in place for welding

ridge and at the center of the bottom chord. All other connections between the diagonal struts and the top and bottom chord members are made directly by means of fillet welds.

The trusses were also fabricated in specially constructed jigs, which resulted in a large saving in labor costs. Fig. 3 shows the typical arrangement of jig and truss.

The jig frame consisted of 12-in. channels with guide and supporting angle clips welded in place. For convenience in welding the jig was placed on top of I-beams resting on the floor. In assembling the trusses the angles for the lower side of the truss were jigged and tack-welded, spacer bars and tieplates were inserted, the angles for the upper sides of the truss were jigged over those for the lower side, and the entire assembly was welded together on the upper side. The truss was then removed from the jig, turned over and the other side finish-welded, to complete the truss. As in the case of the columns, the first few trusses were completely welded in the jig, but after the job was well under way, tack-welding only was done in the jig with finish-welding following.

The crane girders required no fabrication work. One bolt hole was placed in the web at each end, so that they could be bolted in place on top of the column for welding.

In tests made on the erected trusses, using a load equivalent to the total design load of 45 lb. per sq.ft. of roof, there was no distress noted in any welded connection. The actual deflection proved to be about one-half of the assumed deflection, computed on the basis that all members were pin-connected.

Tests Indicate Thick Steel Plates Meet Specifications

Results from about two dozen coupons from 2 1/16 in. plate rolled from a single ingot show uniform yield point and ultimate strength varying from 53,800 at the bottom to 60,800 lb. per sq.in. at the top of the plate

By F. O. DUFOUR

Consulting Engineer, United Engineers & Constructors Inc., Philadelphia, Pa.

DURING the design of an unusually large flat-bottom steel water tank, in which the bottom ring of the shell called for plates more than 2 in. thick, the designers deemed it advisable to make a careful study of the physical and chemical properties of the metal in coupons cut from the bottom, middle and top (corresponding to the position of the metal in the original ingot) of a sample plate. There is a decided lack of detailed information available concerning the properties of thick steel plates, which are coming more and more into general use, so that the data from this study are presented in the hope that they may prove useful.

The steel plate was $2\frac{1}{16}$ in. thick and 356×54 in. in plan, weighing 11,200 lb., or 84.15 lb. per sq.ft. It was rolled from a single ingot, 54×23 in. and weighing 16,000 lb. It was selected at random from 28 plates ordered from the Lukens Steel Co., Coatesville, Pa. The steel was not killed, was bottom-poured in the ingot and was made to comply with the specifications of the American Associaton of Steel Manufacturers for class A steel, the requirements for which are given in Table I.

Coupons were flame-cut from the plate, as shown in Fig. 1, milled to standard dimensions and tested in tension and in bending (Figs. 2 and 3). Where two specimens have the same designation, one was tested in tension and the other in bending, but no record was made of which one was used for each test. Check chemical analyses were also made on a number of the coupons from borings made both through the thickness and through the center of the plate.

The results of the physical tests and of the chemical analyses are given in Table II. No pieces except *Ax* and *Bx* cracked on the outside of the bend. Examination of the results show that while certain coupons in the upper part did not meet the requirements in regard to elongation and reduction of areas and ultimate tension stress, the physical properties, including the bend test results of other coupons close to them, indicate that the fault lay largely in the testing procedure. In the lower part of the plate the ultimate strengths of the coupons did not quite come up to 55,000 lb. per sq.in., but the elastic limits and other physical properties showed that for all practicable purposes the plate met the specifications.

A study of the results of the chemical analyses shows a segregation of non-ferrous elements in the top part of

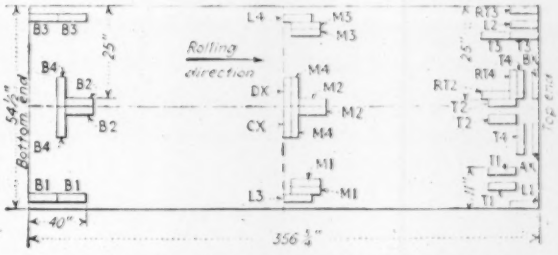


Fig. 1—Location of test coupons in $2\frac{1}{16}$-in. steel plate

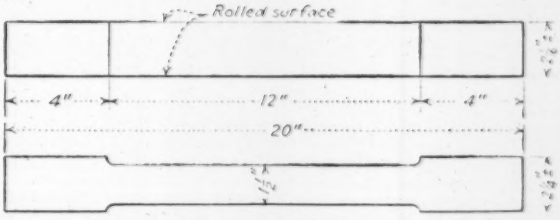


Fig. 2—Test specimens used in tension and bending

TABLE I—REQUIREMENTS FOR CLASS A STEEL
(American Association of Steel Manufacturers)

Chemical Properties

Elements	Per Cent	
Phosphorous, maximum		.25*
Basic, open hearth	0.04	0.05
Acid, open hearth	0.06	0.075
Sulphur, maximum	0.06	0.075

*Check analysis: The phosphorus and sulphur content thus determined shall not exceed that specified by more than 25 per cent.

Physical Properties

Tensile strength, lb. per sq.in.	55,000 — 65,000
Yield point, minimum lb. per sq.in.	0.5 (tensile strength)
Elongation in 8 in., minimum, per cent†.	1,400,000/tensile strength.

†Minus 1 per cent for each ½ in. over ¾ in., with minimum of 18 per cent.

Bend Tests

Bend test specimens shall stand being bent cold through 180 deg. without cracking on the outside of the bent portion, as follows: For material over 1¼ in. in thickness, around a pin the diameter of which is equal to twice the thickness of the specimen.

TABLE II—RESULTS OF CHEMICAL ANALYSES AND PHYSICAL TESTS

Mark	Check Chemical Analyses: Through Thickness C	Mn	P	S	Through Center C	Mn	P	S	Yield Point, Lb.	Tensile Strength, Lb.	Elongation, Per Cent in 8 In.	Reduction of Area, Per Cent	Degree of Bend
F1	.33	.37	.045	.054	.43	.43	.072	.095	37,300	60,680	25.00	42.9	180*
L1	.36	.40	.058	.073	...	...	...	...	38,200	62,700	24.00	...	...
RT2	...	...	...	...	...	...	...	...	38,440	59,200	7.50	...	...
T2	...	...	...	...	...	...	...	...	35,030	59,960	Square	Fracture	180 flat†
T3	.24	.37	.040	.046	.28	.37	.040	.056	35,200	61,920	10.00	7.6	180
RT3	...	...	...	...	...	...	...	...	35,600	59,760	25.75	40.4	...
L2	...	...	...	...	...	...	...	...	34,500	61,500	23.25	...	...
T4	.31	.40	.050	.066	.38	.35	.060	.087	34,180	47,300‡	Broke with beam up		180
RT4	...	...	...	...	...	...	...	...	36,740	49,870‡	Broke with beam up		...
A2	...	...	...	...	...	...	...	...	...	...	...	...	90
B2	.33	.36	.054	.062	...	...	...	...	...	...	...	...	115
Average	...	...	...	...	...	...	...	...	36,100	60,800	...	...	...
M1	...	...	...	...	...	...	...	...	35,050	57,460	30.50	40.6	180
L3	...	...	...	...	...	...	...	...	37,900	56,800	27.50	...	...
M2	.24	.35	.040	.041	.22	.34	.038	.041	36,850	56,460	27.50	43.4	180
M3	.24	.33	.040	.044	.22	.35	.037	.047	35,850	56,380	29.00	41.1	180
L4	.23	.36	.054	.062	...	...	...	...	31,100	56,300	25.00	...	...
M4	...	...	...	...	...	...	...	...	38,200	55,740	25.00	33.7	180
Cx	.26	.35	.038	.041	...	...	...	...	...	...	...	...	180
Dx	...	...	...	...	...	...	...	...	...	...	...	...	180
Average	...	...	...	...	...	...	...	...	35,800	56,500	...	...	...
B1	.21	.33	.032	.035	.20	.33	.033	.037	34,560	54,440	29.00	47.5	180
B2	.20	.32	.035	.039	.21	.33	.037	.043	34,950	53,480	31.00	43.6	180
B3	.21	.32	.034	.040	.20	.33	.035	.042	35,500	53,200	26.25	44.8	180 flat†
B4	...	...	...	...	...	...	...	...	35,070	54,220	25.75	32.5	180
Average	...	...	...	...	...	...	...	...	35,000	53,800	...	...	...

*Bent around a pin with diameter equal to two plate thicknesses. †Hammered flat after being bent around pin. ‡Not included in averages.

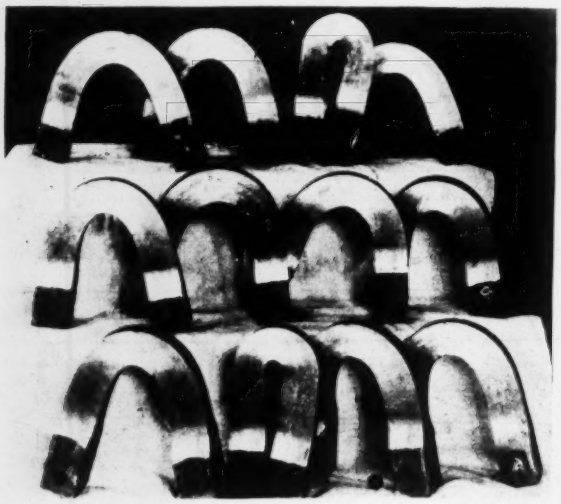


Fig. 3—Coupons cut from 2 $\frac{1}{16}$-in. steel plate after being bent around a pin of two plate thicknesses in diameter

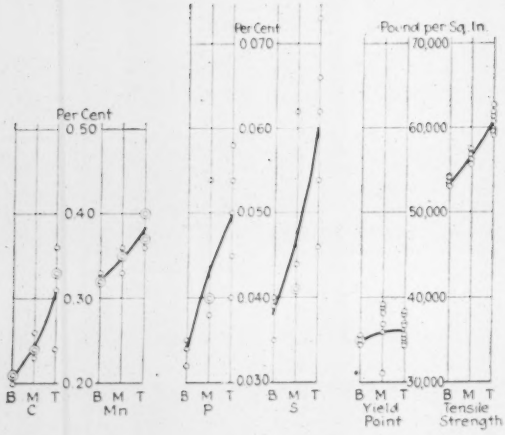
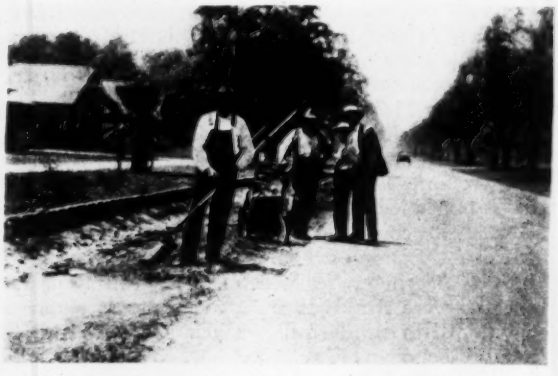


Fig. 4—Variation in chemical analysis and physical properties from bottom to top of plate

the ingot, as was to be expected, but not enough to be injurious, and also a slight segregation in the center of the plate. This segregation of non-ferrous elements is accompanied by a variation in physical properties, as follows: From the bottom to the top of the plate, with the increasing percentages of carbon, manganese, phosphorus and sulphur, there is likewise an increase in the yield point and the tensile strength and a decrease in ductility. This relation is shown in Fig. 4.

Weed Burning in City Streets

Danger of fire from the dry weeds and grass that line country roadsides, together with the program of the California state highway department in spraying them with oil and then burning, was described in *Engineering News-Record*, May 14, 1931, p. 812. The accompanying photograph shows a hand method employed on the

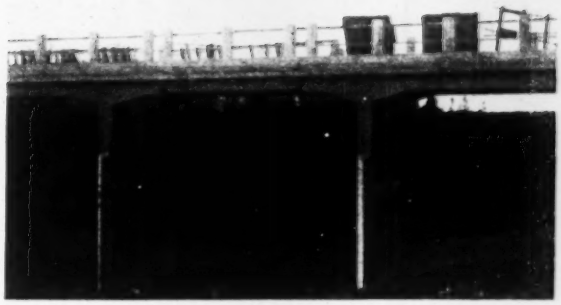


Weed burning in California clears streets of fire danger

outlying city streets of Ontario, Calif. The equipment consists of a mounted 20-gal. tank for the crude oil, connected by hose to a torch burner that is directed on the grass and weeds. By June the grass and weeds are dry in this climate. Two men with this outfit can cover 12-ft. strips on each side of a center paving for two to three blocks per eight-hour day. The oil costs 5c. per gallon.

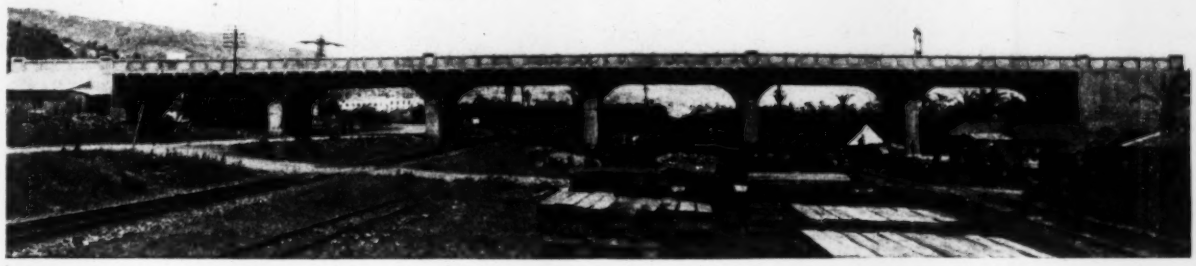
Modern Bridges in Palestine

WITHIN the limits of a small budget the public works department of Palestine is actively improving its road and bridge system. Its problems are diverse in character, as is illustrated by two recent structures. A bridge over the Kishon River near Nahlat Yakob, 12 miles northeast of Haifa on the Nazareth road, had to be built in a great hurry. By erecting available structural-steel material to form a five-span cantilever bridge (three fixed spans, suspended spans in the two intermediate bays, all spans about 20 ft.) and subsequently encasing the supporting members the bridge was completed very rapidly. In the incasement work the entire formwork was suspended by hanger rods hooked over the I-beams.



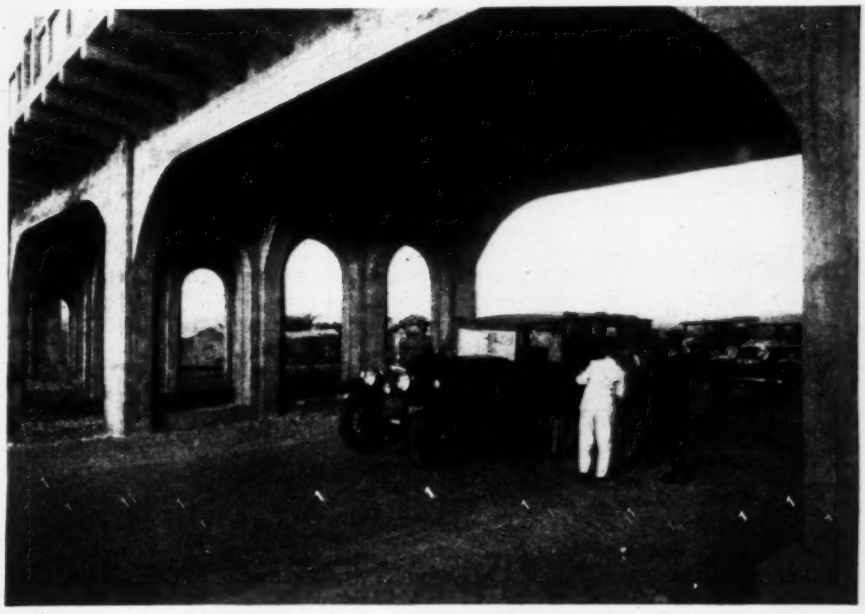
Concrete incasement of a steel cantilever framework of five 20-ft. spans was adopted as the quickest way of providing a bridge across the Kishon River near Nahlat Yakob, on the Haifa-Nazareth road

An important grade separation just completed 3 miles northeast of Haifa, leading to a district known as the Oil Storage Area, has six spans of about 50 ft. each, crossing existing and future railway tracks and a main road. It comprises three pairs of continuous spans. The width is 39 ft. over sidewalks, or 28 ft. between curbs. Two unusual features of this structure are the use of structural reinforcement (angles and flats) in place of round bars and the use of old iron nails as an admixture to the concrete in certain parts of the structure. The structural reinforcement is intended to give greater strength against earth tremors than it was thought would be obtained with bar reinforcement. The use of nails in the concrete, which was possible because a large stock of old nails from forms and the like had accumulated and could not be sold profitably, had the purpose of increasing the shear resistance of the concrete at points of heaviest shear. The hand railing was built of precast panels set between posts cast with the floor beams and slab. The adjacent illustrations show the substantial character of this structure.



Largest and widest bridge in Palestine

Grade separation just completed near Haifa; length 344 ft., width 39 ft. over all; contains structural reinforcement and embedded iron nails.



Simple structural elements effectively used for esthetic effect in grade separation near Haifa

This entire structure cost only $25,000, or about $18 per cubic yard. Construction was carried out for the city of Haifa by the public works department of the government. P. W. Etkes is district engineer of the Haifa district, under the direction of Fawcett Pudsey, the director of the public works department of the Palestine government.

Field Observations of Highway Practices

Bituminous Macadam Highways in Rhode Island

Foundation design and construction materials and methods kept to the high standards and close control governing most costly rigid pavement construction

By C. S. HILL
Associate Editor, Engineering News-Record

BITUMINOUS MACADAM has had a prominent place for more than a quarter of a century in Rhode Island road construction. Some of the standards developed have become criteria for excellence of design and construction. The state practice of designed foundations, or sub-bases, for bituminous macadam has in particular exerted wide influence and has placed asphalt- and tar-penetrated stone high among heavy-traffic road surfaces. It is emphasized that bituminous macadam, as considered in this article, is a coarse aggregate bonded by the penetration of asphalt oil or tar applied on the surface. No mechanical mixing of aggregate and binder occurs.

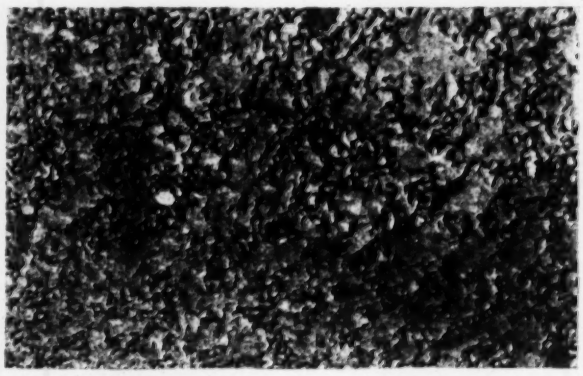
Rhode Island has 571 miles of state highway, of which 204 miles is bituminous macadam constructed from 1913 to date. The state is densely populated, intensely industrial and has many largely visited shore resorts. Its road traffic is consequently heavy, probably heavier than that on any other state highway system. Because of the many industries heavy motor trucking is a substantial part of the traffic. This total of traffic is subjected to no load restrictions on bituminous macadam except such as apply to all roads; and as the roads are kept open in winter, the use of them is evenly distributed over the twelve months. These facts are important in establishing the character of service afforded by bituminous macadam in Rhode Island. It is in every respect a general service road and receives this consideration in engineering design and construction.

Foundations Are Crucial Consideration

Bituminous macadam is one of the flexible plastic types of pavement. This is the fundamental thought in all design. A strong and stable foundation is the first design requirement. The surfacing has little flexural strength and will follow down any foundation subsidence even of small area. Solid foundations are therefore religiously sought. Swamps and boggy places are excavated, and replacement with firm material is carried to hard bottom. Wet places in the subgrade are drained, and, if the soil is retentive or of high capillarity, new foundation material is provided.

The study of unfavorable soil conditions is in detail and not a general survey. The conception of standard design below the pavement does not exist. It is considered that unless soil conditions are uniform, a uniform foundation design either invites disaster in the worst places or involves useless expense where conditions are good. Instead, an attempt is made to locate each unfavorable foundation condition, study the reason for the weakness and then adopt a treatment that will eliminate the weakness in each case. Diagnosis extends beyond the soil characteristics to the effect of soil location. For example, in crossing serrated ledges the soils, which physically are good foundation material, may be unstable and subject to frost action from ledge-pocketed water. Spring and winter records of frost heaves are carefully observed as indices of danger points.

All these studies contemplate special foundation construction to meet the conditions. This construction ranges from a sub-base of granular material to interrupt capillarity to a substantial foundation of field stone of telford-like character. Gravel is most commonly used as an insulating sub-base to reduce capillary flow, and a coarse gravel is preferred. Of the material passing a 2-mesh screen it is desired that not more than 25 per cent should pass a 40-mesh screen. Where the water movement is seepage rather than capillary flow, the stone sub-base is considered more effective than bank-run gravel. If the subsoil is fine and works up into the telford, a blanket of gravel is laid under the stone.



Texture of road surface shortly after completion, which later appears in mosaic pattern as traffic irons surface and wears off the oil

Foundation treatment, it will be perceived, contemplates securing a pavement-supporting structure and effective drainage in one operation. The depth of foundation is determined by the local conditions, and no general rule is practicable.

Pavement Construction

The weaknesses of bituminous macadam as often constructed are foundation defects, surface corrugation and surface raveling. Foundation practice has been described. Corrugation and raveling are eliminated by careful construction and selection of materials; carelessness in either task shows up particularly fast in the bituminous macadam.

A hard tough stone is insisted upon, particularly for the top or penetration course. Trap rock is specified,

Constructing gravel foundation for bituminous macadam

Telford-type foundations rolled to compactness and true profiles are constructed in all except the rare cases where the natural subsoil needs no strengthening.

Filling stone base course with screenings

Base course of 2½-1½-in. stone is spread with sand or screenings to fill surface voids when rolled in, but not to form a surface mat.

Spreading trap-rock penetration course

This course is spread evenly and uniformly to depth given by grade stakes. Note the carefully shaped rolled surface of the base course on which the top is being spread.

Spreading keystone after first penetration

These 1- to ¾-in. stones fill the surface voids and are rolled in until closely bonded into the first application, about 1¼ gal. of asphaltic oil.

Applying seal coat to rolled keystone

This coat is covered with ¾- to ⅜-in. stone rolled in.

except on occasion where a softer stone is allowed for base course, and then a coarser crushing (4 to 1 in.) is allowed. In the method of construction adopted it is contemplated that the stone in the penetration course will not be blanketed by the final seal but will be exposed to direct abrasion and impact. Considering trap rock for both base and upper courses the special sizes, in inches, are as follows:

Base course	2½ to 1
Top course	2½ to 1½
Keystone course	1 to ⅝
Cover stone	⅝ to ⅜

Base filler is sand under ¼ in. or crusher dust under 1 in.

The three sizes of body stone are to be noted. This is believed to be important. With the top-course stone penetrated, a stone is needed to fill surface voids but one not so small as to keep the second application of oil from penetrating. This is the purpose of the keystone. The true filler (or cover) stone for fine-void filling after the seal coat is the ⅝-⅜-in. stone. Exact body-stone screen sizes are very closely controlled.

An asphalt oil binder is used with a bitumen penetration preferably between 90 and 100. In shady locations a softer material up to 120 penetration is allowed, but it is believed that any softer material will not give a stable surface. For trap rock aggregate 2½ gal. a square yard is the usual amount of oil; this quantity gives no trouble from softness with the hard tough rock. A smaller quantity is required for softer stone.

Carefully Controlled Construction

The construction procedure is strictly controlled. The base-course stone is spread evenly on the rolled sub-base to give a finished depth of 2½ to 5½ in., depending on foundation conditions and traffic. This course is rolled with 10-ton three-wheel rollers until there is no sinking or creeping, the filler material being added in a series of light applications during the rolling operation, which is limited to 150 sq.yd. an hour. The object is to work the filler down so that the surface of the rolled base presents open voids throughout. Very careful watch is kept to see that the sub-base material does not work up through the base course; and if it does, to remove the base course and recompact the sub-base. A true base-course surface is also sought by adding or taking off stone as the rolling proceeds.

Before applying the top or penetration course the base course is swept clean of loose material, and then the 2½-1½-in. stone is evenly spread to secure a finished depth of 2½ in. No greater depth of top course is allowed; it is doubted that proper compression can be secured for greater depths or that penetration of the binder below this depth is of any practicable value. Compression is considered important, as the objective is to secure maximum bond of the stone before the oil is applied, so that the binder has primarily only to preserve and intensify the mechanical bond. The asphalt is applied at 300-350 deg. at the rate of 1¾ gal. a square yard to perfectly dry stone.

The keystone is applied directly following penetration. Its spreading is given great attention, as the smooth riding of the road depends upon this. Bunching and thinning are carefully avoided. The road is then rolled again until the keystone is pressed into the surface voids and bonded with the asphalt. The ¾-gal. seal coat is finally applied and covered with the ⅝-⅜-in. stone. Then a period of rolling at intervals over a week or more finishes the pavement.

Bituminous macadam roads constructed according to the general practice described are carrying all traffic and heavy traffic in Rhode Island. On 204 miles of state roads built from 1913 to 1930 the maintenance cost in 1930 on surface alone averaged 4 mills a square yard. The surface smoothness is good and the roads can be traveled at 40-50 miles an hour safely and comfortably.

The explanation of these results is in the high construction technique employed. Bituminous macadam is not contemplated as inferior construction but as high-type construction not adequate in many places but capable of excellent and economical service. Accordingly, it is designed and built with full respect to engineering standards and control. In none of the details of design or construction are the requirements for high-type rigid pavements more exacting than in the penetrated-stone road work of Rhode Island.

This article has been prepared from information obtained by inspection in the field of roads under construction and in service for various periods and from records of the state highway department. G. H. Henderson is chief engineer.

Development Statistics for Western States

Development of the eleven Western states as to population and irrigation during the past decade is indicated by figures taken from recent census reports. Population increased on an average of about 19 per cent in the territory. The maximum increase was 65 per cent in California and the minimum a 2 per cent decrease in Montana. The area of land irrigated in these same states increased only about 1 per cent. Arizona had a 23.5 per cent increase and Idaho and Nevada each had 13 per cent decreases. These statistics and some additional facts on the land area and hydro-electric development for the eleven Western states are shown below.

GENERAL AND WATER-DEVELOPMENT STATISTICS FOR THE ELEVEN WESTERN STATES

	Population		Area		Water Power		Irrigation	
	1930 Census	Increase Since 1920, Per Cent	Land, Sq.Mi.	Public Land, National Parks Forests and Reserves (Approximate Per Cent)	Hydro-Electric Installation, Kw.	Potential Power Available 90 Per Cent of Time (U.S.G.S. Est.)	Irrigated Area—1929 1930 Census, Acres	Change Since 1920 Census, Per Cent
Arizona	435,573	30.3	113,810	72	87,050	2,060,000	577,263	23.5
California	5,677,251	65.7	155,652	44	1,642,613	3,430,000	4,731,632	12.1
Colorado	1,035,791	10.2	103,658	38	50,807	651,000	3,426,022	2.3
Idaho	445,032	3.0	83,354	57	221,250	1,585,000	2,152,176	—13.5
Montana	537,606	—2.1	146,131	36	300,014	1,900,000	1,580,321	—6.0
Nevada	91,058	17.6	109,821	83	8,850	224,000	487,241	—13.2
New Mexico	423,317	17.5	122,503	42	0	86,500	551,420	2.4
Oregon	953,786	21.8	95,607	47	154,030	2,730,000	937,068	—5.0
Utah	507,847	13.0	82,184	75	95,790	1,060,000	1,323,703	—3.5
Washington	1,563,396	15.2	66,836	29	541,165	5,340,000	503,458	—5.0
Wyoming	225,565	16.0	97,548	58	11,230	525,000	1,233,604	2.1
Total	11,896,222		1,177,104		3,112,799	19,591,500	17,483,908	
Per Cent of U.S.	10		40		38	51		

Rochester Prepares in Advance for Unemployment Relief Work

Public work system inaugurated last winter to be revived and improved—80 per cent of money used for direct labor—City receives from 70 to 75 per cent return for expenditure

PLANS for mobilizing municipal public-works resources to alleviate distress due to continued unemployment are well advanced in Rochester, N. Y. (industrial city, population 328,132). Profiting by experience gained last year, when 7,917 men were given work on 77 projects aggregating $800,000 in cost, preparations are now being made for the planned expenditure during the coming winter of probably one million dollars for municipal works. Last year 80 per cent of the money spent went to labor; this year, with the advantage of advance planning and budgetary control, a higher proportion is expected.

Administration—Full control over the emergency relief program is in the hands of a work relief committee. This committee organizes the work and presents to the city council an estimate of the funds required. It also establishes policies regarding hours of employment, wage rates and eligibility for relief, and selects the projects to be undertaken. The active head is a work relief director, appointed by the city manager.

Selection of Men—As the purpose of the enterprise is to give relief in the form of work solely to those able-bodied men who find themselves unable to maintain their families, applicants are selected primarily on the basis of need. A distinction must be drawn between seasonal workers temporarily out of employment and those in actual distress. A careful investigation is made of each applicant by a staff experienced in this type of work.

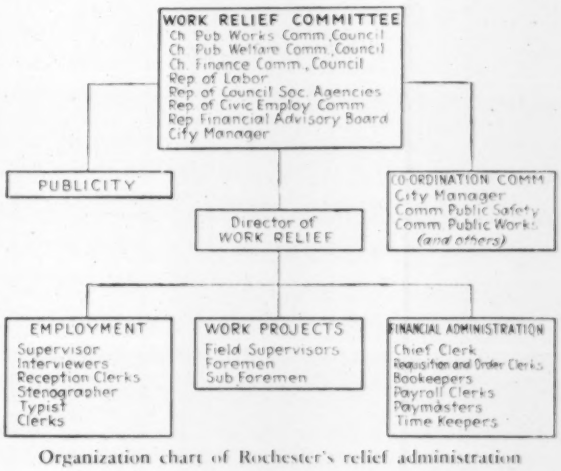
As a prerequisite to application for work, applicants must register with the public employment center of Rochester. Having fulfilled this requirement, the applicant, at his request, is given an appointment to meet an interviewer at a specific later date. Interviews are conducted along the lines of accepted practice in case work. Statements are verified by the individual interviewer, with the cooperation of the various welfare agencies in the city. With all available and verified information at hand, the interviewer then classifies the applicant as in need of immediate work, of work in the future or denial of need.

An applicant who has had an interview and returns for a second conference should be referred to a special interviewer who will, in most cases, be able to explain to the man why he has not been put to work. If necessary, he will make an appointment for him to meet the original interviewer, should changing conditions or additional information seem to warrant such action. In no instance should a returning applicant be given access to the original interviewer without this procedure.

It is important to prevent large groups of unemployed men from congregating in any one place, since the exchange of experiences too often accentuates the difficulties in which they find themselves. For this reason it is recommended that the bureau should be located apart from other city administration offices and not in proximity to any family-welfare agency, either public or private. Also, the first application should be made at a place apart from where the final interview is held.

Last year about one-third of the jobs available were assigned to private and public agencies to be used in case-work treatment or, in some instances, as a work test. This year this plan will be discontinued, and all needy cases will make applications through the regular channels. When, in the judgment of a family-welfare agency, one of its clients should be given preference, the supervisor of the application bureau is so notified in writing with the understanding that such a request does not necessarily mean approval, since the final responsibility for selection rests with the application bureau.

Upon requisition from the work director for men or women the supervisor selects a suitable number of applicants and notifies them by mail where and when they



Organization chart of Rochester's relief administration

should report for work. After an applicant has been given a job he must continue to keep alive his registration with the public employment center and must give evidence that this has been done to the timekeeper on the particular project where he is employed.

Wages and Hours—Wages are paid at prevailing rates for the type of work done, whether skilled or unskilled. Last winter common labor was paid 45c. per hour, and the trades in accordance with union rates. The unskilled worker, however, averages two or three days a week, while the skilled worker averages only one day in eight, making his income the same as that of the unskilled laborer.

Type of Work Done—In selecting projects those are favored in which a large proportion of the cost can be spent for direct labor, and an effort is made to avoid those that should logically be done under contract. The 77 projects that formed last year's relief program included the construction and repair of roads, barns, storehouses, comfort stations, golf shelters, retaining walls, parking spaces, a water line, a boardwalk and the demolition of an abandoned blast furnace on city property. Through the cooperation of the city manager and the heads of the various city departments, forming a coordination committee, a list is made of all possible projects. These should be worthwhile in nature and not obviously "made" work, in order to maintain the morale of the workmen and also to attain maximum efficiency from expenditures. The coordination committee prepares plans and specifications for each project and submits a report giving the cost of labor and materials, the type of labor and equipment needed and the number of men that can be worked per shift. Final selection of the projects is in the hands of the work relief committee.

Field Supervision—For purposes of administration it appears best to have all relief projects separated from

other departmental administration; yet the success of the relief plan depends largely on the sympathetic interest and close cooperation of all city departments. Only through such cooperation can the city obtain a maximum of efficiency. All work is done in accordance with set standards required in the conduct of similar public improvements under ordinary circumstances. Final responsibility for checking and inspecting all work on relief projects rests with the coordination committee, but day-by-day supervision is in the hands of the work relief director, who has a supervisory staff headed by a work supervisor, which requisitions men, materials and equipment and carries out the projects according to plans and specifications through the direct supervision of foremen and subforemen. The work supervisor must see that, as far as possible, the city obtains a fair day's work for a day's pay, but must impress upon the foremen that the men shall be neither overtaxed nor undertaxed physically. Any foreman may remove an employee from his project for cause, returning him to the work relief director with the reason for his action.

Finances—Money for prosecuting the work is appropriated by the city council in accordance with the recommendation of the work relief committee. A financial department is set up under the relief director to provide budgetary control of each project at all times.

Return to the City—It has been estimated by social work executives that had relief work not been undertaken last winter, home relief expenditures would have been considerably in excess of the $800,000 expended for public works. While it is realized that, for self-evident reasons, maximum efficiency cannot be obtained on relief work of this type, a return of from 70 to 75 per cent, based upon the cost of the same projects under normal conditions, is expected during the coming winter as a result of last year's experience, modified by better planning and control.

* * *

$250,000 Pipe Line Gives Work to 2,300 at Lowell, Mass.

DAY LABOR was used by Lowell, Mass., to construct a force main costing $250,000 between the city's wells and the iron-removal plant. The work included laying 22,000 ft. of 20- and 22-in. cast-iron pipe, a canal crossing, a river crossing through a box in a concrete arch bridge (requiring the removal and replacement of previously laid gas and water pipes), considerable rock excavation and the cutting and replacement of improved pavement for about one-third the length of the line. As the job was undertaken at this time purposely to relieve unemployment, no trenching machine was used.

From March 30 to Sept. 10, 1931, 2,300 different men were on the payroll, with a daily average of 125. The entire working force was replaced at three-day intervals, with the exception of the foreman and those directly connected with pouring the joints. In Lowell, as in all Massachusetts cities exceeding 100,000 population, common labor is subject to civil service regulations, and the workmen were selected from 3,000 who were eligible.

Although the frequent changes in personnel are believed to have increased the cost of the work by 20 per cent, about $115,000 expended for labor was distributed among the largest possible number of men, resulting in a marked decrease in city expenditures for welfare work during the construction period.

Brick-Incased Columns Stronger

IN TESTS at the Bureau of Standards to determine the strengthening effect of embedding a steel column in a brick pier, three bare columns of length ratio 185 failed by lateral buckling at loads approaching 24,000 lb. per sq.in., while six brick-incased columns carried loads of 40,000 lb. per sq.in. without appreciable lateral deflection. At this load the projecting end of the steel column crumpled. The embedded part of the column and the brickwork were apparently not injured.

The series of nine tests in which these results were obtained was completed last week with the cooperation of the Common Brick Manufacturers Association. In each case the column was a 6-in. 20-lb. H-section 23 ft. long, with square ends seated against 8x8x½-in. plates in the testing machine. When bare, such a column has a length ratio of 185, and if unstiffened would fail by buckling; but when incased in brickwork it would be partly or wholly restrained from buckling and therefore able to carry a greater load. The tests verified this expectation.

Three columns were tested bare. Six were tested after incasement in a brick wall 14 in. thick and 6 ft. long, carried up from the base to within about 10 to 12 in. of the top, or about 22 ft. high. The upper head of the testing machine bore on the steel column through a ½-in. plate, but had no contact with the brickwork, while the base of the wall as well as of the column rested on the lower head of the machine so that the reaction was distributed in some measure over the full area of the wall. The brick wall by itself, computed as a homogeneous rectangular prism loaded at its ends, had an l/r value of about 65.

Hard-burned building brick was used for the walls. They were laid up in cement motar of 1 : 3 mix, with an addition of hydraulic lime equal to one-tenth of the cement weight. The courses were well bonded. Shove-jointing was used near the steel, all joints were slushed full, and the space directly around the steel was grouted. In three walls the web of the steel column was at right angles to the width of the wall, and in three it was parallel to the width; no difference in strength was observed.

TESTS OF BARE AND BRICK-INCASED STEEL COLUMNS

Steel column, 6-in. H, 20 lb. per ft.; sectional area, 5.38 sq.in.; length between ½-in. end plates, 23 ft.; brick incasement, 14 in. x 6 ft., 22 ft. high.

	Lb. per Sq.In.	Average
Bare columns	24,000	
	23,000	23,300
	23,000	
Incased columns	39,700	
	42,500	
	42,300	
	39,800	41,800
	44,000	
	42,500	

Failure of the incased columns occurred by crumpling (local buckling) of the flanges in the projecting length of bare steel, 10 or 12 in. long, but there was no sign of bending in the body of the column. After the tests the brickwork was knocked off. It proved to be firmly adherent.

The tests did not determine how much strength may be realized in a column embedded throughout its length, where the brickwork shares in carrying load throughout and no steel is left exposed to local failure. In such condition, found normally in building columns incased in brickwork, a further gain in strength should be realized through reduction of the net load going to the steel.

Municipal Problems Discussed at Pittsburgh

American Society of Municipal Engineers deals with large list of questions ranging from finance to paving and from airports to sanitation

Engineering News-Record Staff Report

MANY PROBLEMS and engineering responsibilities with which the city engineer deals were covered in the half-hundred papers and reports making up the program of the American Society of Municipal Engineers at its convention in Pittsburgh, Oct. 19 to 23. Major items related to city planning, municipal finance, traffic control, water and sewage treatment and garbage disposal, street paving and unemployment. Numerous committees also reported, the usual procedure being a resumé by the chairman of the present status of the subject and several papers by members on specific questions.

The secretary's report revealed a net membership increase of 140 to a total of 726 and a $1,500 increase in collections. The first chapter of the society has been formed at St. Louis and has held some half-dozen meetings to which non-technical officials and heads of civic and improvement organizations were invited to hear city projects discussed by the city's own engineers.

Changes in the constitution to fit the new name of the society, adopted last year, involve a reclassification of membership into members (twelve years' experience), associate members (all other professional and subprofessional engineers), and affiliates, (any one having an interest in engineering). The dues are $7.50 for the members and $6 for all others. One-third of the dues may be refunded to chapters for local use.

In accordance with recommendations in the address of the president, John W. Reid, a committee was appointed on municipal engineering personnel to fix standards of service and compensation. The plan to reprint all of the society's specifications following this year's convention was deferred one year.

The Greeley awards for long-time service by engineers in municipal work were presented to Ellis L. Dutton, who has served Minneapolis for 47 years, to Robert Hoffman, who has been with the Cleveland engineering department since 1893, and to J. H. Dingle, with the city of Charleston, S. C., for 38 years. Mr. Dutton started as a levelman and is now assistant city engineer. Mr. Hoffman entered the service of Cleveland as a rodman and rose to be commissioner and chief engineer of the division of engineering and construction. Mr. Dingle, now city engineer, started as a surveyor for the city.

Officers elected for the ensuing year were: president, J. H. Neeson (Philadelphia); vice-presidents, S. A. Greeley (Chicago), C. M. Reppert (Pittsburgh), and Harrison P. Eddy, Jr. (Boston); treasurer, Hymen Shifrin (St. Louis). C. W. S. Sammelman was re-elected by the board of directors as executive director.

Thirty companies plus the various departments of the city of Pittsburgh occupied space in a well-attended and instructive exhibit of materials and equipment used by city engineers. These exhibits included four associations, water meters, mixers, office and drafting-room equipment and instruments, floor gratings, flooring, pipe, pipe coating and jointing materials, stand pipes, steel and concrete cribbing and steel sheetpiling, pumps, cement guns, concrete-aggregate weigher, safety bridge railing, paving materials of concrete, brick, asphalt and tar, sewage-sludge equipment and waterproofing compounds.

City Planning

A group of a dozen coordinated papers and reports on city planning, airports, street lighting and traffic control occupied two full sessions. Jacob L. Crane, city plan engineer, Chicago, chairman of the city planning committee, feels that the efforts put forth in this country have not been a spectacular success, hence he attempted to take stock and obtained from seven members an answer to the question as to what was most urgently needed to make city building successful. The views obtained show a wide divergence. Thorough financial planning and a definite trend away from political monuments ran through all of the answers. Mr. Crane summed up the necessary factors thus: good government and good personnel; a revision of our system of land speculation; education of students and citizens; good technical work and more direct authority for city plan commissions; more care in preparing plans and more effectiveness in carrying them out.

"What About Parks?" was the subject of a paper by Francis J. Mulvihill, chief, Pennsylvania division of city planning. He showed how parks are good investments by presenting reports from 32 cities indicating increased property values as a result of new parks. We now have 300,000 acres in this country devoted to parks. This acreage should be doubled, said Mr. Mulvihill.

The Practical Side—Excessive tax delinquencies and mandamus charges have forced Philadelphia officials interested in city planning to call a halt on many desirable improvements. Thomas Buckley, assistant chief engineer and surveyor, bureau of engineering and surveys, outlined in an extended paper the practical side of city planning. After the city planning commission has submitted recommendations, the bureau must put them through. While cooperating in the work of the commission the bureau has been conducting independent surveys and reviewing the practical aspects of Philadelphia's planning problem. Succinctly he concludes as follows:

> The degree to which any municipality can indulge in the purchase of monumental improvement projects will depend entirely upon its economic status as measured directly in terms of its existing liabilities, its assets in terms of taxables, its borrowing capacity, its methods of financing the city plan and its creative resources, and the amount of competitive energy and investment that can be developed in various commercial lines without causing hardship and blight in certain districts. The economic and social structures of any city can support successfully, in any given area, at any set time, a certain amount only of each of the varied uses that the particular environment demands.

Airport Terminals—Closely allied to city planning is the subject of airport-site selection. Particularly is this so since the most insistent trend is toward close-in sites. All three speakers on the airport subjects and the major portion of the discussion revolved around the problems of the close-in airport as a necessity for passenger busi-

ness. This phase presents a challenge to the city planner.

Perry A. Fellows, engineer manager, Detroit city airport, as chairman of the society's active committee on airports presented a 100-page report covering in a comprehensive way the whole subject of terminals for airplane transportation. Promotion, ownership, supporting groups, finance, administration, design, construction and maintenance, rating, trends, clearing, drainage, surfaces, runways, aprons, service roads, auto parking, markings, fencing, seating facilities, building construction and maintenance, airport equipment and operation, personnel and organization are a few of the headings of chapters.

In discussion W. W. Horner, St. Louis, indicated that the report reviewed the whole field and that no such comprehensive treatment had been given to the subject heretofore. Concerning the location of close-in ports Mr. Fellows stated that the city planner would be called on to consider not only the open-space requirements at the port but the need for open roadway lanes leading away from the port, such as wide highways with cleared parking between two roadways on which planes might set down in emergencies. The 84-ft. width of the parking on the superhighways of Detroit is sufficient for this purpose. Only shrubs should be used in landscaping.

Air-Traffic Analysis—With 675 planes owned by organized transport companies and 10,688 altogether, congestion has not been noticeable at most airports. On a few of the busier terminals certain other activities, particularly schools, have been found to interfere with transport operations and have been ruled off. A trend towards specialization among airports is evident, and the outlines of the ultimate ground system to serve large communities is beginning to emerge. So stated A. Pendleton Taliaferro, Jr., chief of airport section, aeronautics branch, U. S. Department of Commerce.

Time studies are being made by a committee on airport traffic control, breaking down the traffic flow into units of time required to get a plane from the open airway through an airport and back again on the open airway. It involves time circling the port, time from moment when wheels touch the ground to the moment the loading platform or service pit is reached, time from moment plane is blocked to unblocking, time from unblocking to beginning of take-off and from take-off to moment it is on the way. The time from blocking to unblocking measures the efficiency of the terminal facilities rather than its layout. Where only one movement at a time is possible 24 movements per hour represent the capacity of a German airport. This is checked in this country at a large terminal where 25 movements per hour are accommodated, one at a time.

With cruising speeds of 150 miles an hour and 200 miles an hour just over the horizon, air transport deals in seconds where the older forms of transportation deal in minutes. Gains made on the open airway may be lost at inefficient terminals if the time element is not studied and controlled at these points in the system.

R. C. Marshall, president, Thomson Aeronautical Corp., in his paper on terminal facilities stressed the necessity of providing comfort for the passenger in the way of absence of dust, easy accessibility, clean waiting rooms, restaurants and central ticket offices. Shop facilities, wide taxi driveways and hard-surface approaches are needed by the operator, as well as radio control, floodlights and an airport manager dominating and coordinating all other activities at the airport.

Two emergency expedients to speed up federal public works were urged in a resolution of the American Society of Municipal Engineers at Pittsburgh last week. They are:

1. That the government employ qualified private engineers and architects to prepare plans and specifications and to supervise the construction of governmental projects, and

2. That an adequate temporary agency be created with authority to effect the coordination of the methods, policies and progress of the various federal departments, and to take such other steps as may be necessary to carry out the intent of this program—namely, that all construction projects authorized or to be authorized by the federal government be placed under contract within the shortest period of time possible, by utilizing all the available resources of the nation.

Street Lighting—Ellsworth Francisco, bureau of lighting, Newark, N. J., reporting for the street-lighting committee, proposed that financing could be expedited by raising less funds by bond issue and more by special assessment. Especially is this true for ornamental over the strictly utilitarian facilities. He also asked the society to adopt the code of street lighting of the Illuminating Engineering Society. The code will be printed and brought up for adoption next year.

Traffic Control—The operation of the New Jersey traffic commission in handling applications for installations and in setting up standards for traffic-control signals was outlined by Arnold H. Vey, traffic engineer of the commission. Total vehicular volume of 1,000 per hour for twelve hours is the usual requirement for permission to install a stop-and-go light.

E. A. Kemmler, highway engineer, Akron, Ohio, reporting for the traffic-control committee, reviewed the statistics of accidents and remarked on the gradual adoption of the uniform regulations promulgated by the national conference on street and highway safety. He then presented a symposium of four papers by his committee members. These papers in the main related to non-technical phases of the subject. Delay counts given by George H. Nye are thought-provoking. At a large number of street crossings without regulation the delay per vehicle was 0.22 sec., at crossings with a vehicle-operated control the delay was 4.5 sec., and at crossings with time signals the delay was 10.7 sec. Assuming 10,000 vehicles per day, a saving of $6,570 per year was estimated for traffic operated over time signals.

Paving

Control of driveway entrances was the subject of investigation by the committee on street paving, headed by P. L. Brockway, city engineer, Wichita, Kan. From 200 replies to a questionnaire the committee concludes that no detail of street design and operation is in a more unsettled state. About the only detail in which there is any real agreement among the cities is that driveways are not permitted to incroach on the curb and walks within the intersection of the street lines. A few cities have stated that in their attempt to remove gasoline pumps from the parking within the street area they have been quite lenient in the matter of driveway entrances to the pumps when located on private property. A very few

indicated that they have been quite lenient in the matter of restricting driveways because they wished to encourage industries. Briefly, the investigation showed that there is a lively interest among public officials throughout the country in the situation, but that no trend toward a standardized procedure is discernible.

While no definite recommendation was made, the length of curb to be removed for a driveway is probably between 30 and 40 ft., tending toward the shorter width in wide streets having a heavy pedestrian use. The wider width is needed on narrow streets.

Joint Fillers—The requisites of a good pavement-joint filler, according to Clarence D. Pollock, consulting engineer, New York City, are as follows:

It should hold the blocks firmly in position, remain permanently in place, afford support to the edges of the blocks and thus prevent chipping and consequent rounding of the heads of the blocks or bricks. It should be easy to apply, reasonable in cost, and a material that will carry traffic directly after it has been placed.

Asphalt mastics when properly made and applied seem to satisfy the above requirements better than any other material at the present time. However, in the case of brick pavements, when the bricks do not have lugs to space the courses, it has been found difficult to obtain a thorough penetration of the mastic into the joints, and consequently a straight asphalt filler has been generally used. This has resulted in more or less trouble in warm weather, as the filler softens and swells out upon the surface of the pavement and becomes "sticky" under traffic. When lug brick are used or "spacers" are employed to separate the courses, an asphalt and sand mastic has been used with satisfactory results.

The most widely used mastic for stone-block fillers is the one in the standard specifications of this society, in which the asphalt has a penetration of 60 to 70 at 77 deg. F., which is the third filler in the list of four in the pamphlet issued by the division of simplified practice of the U. S. Department of Commerce. To this is added dry hot sand, all of which will pass a 10-mesh sieve and not less than 85 per cent will pass a 20-mesh sieve. The best results are obtained when as near 50 per cent as possible of the mixture by volume is sand.

For more than two years past the New Jersey state highway department has used a prepared mastic filler in the joints of granite-block pavements. This mastic is composed of asphalt having a penetration of 85 to 100 at 77 deg. F. and about 45 per cent of slate dust by weight. The engineers consider that they have obtained better results with this filler than with the mastic using sand.

Repairing Cut Pavements—Based on information obtained from 40 cities E. K. Smith, Portland Cement Association, stated that there were no important differences reported in the methods employed in repairing service cuts in concrete pavements. Hand labor is today reduced to a minimum by the use of an air compressor and pavement breaker. In Iowa several counties rent such equipment to the smaller towns. A $1,500 to $3,000 outfit seems most practicable for cities of 20,000 population or greater. If digging is hard, the breaker is used in the trench. Air-tamping insures a compact backfill in many soils.

Mr. Smith recommended the following procedure:

After the cut is outlined with chalk, the operator of the breaker usually follows the outline with his breaker point, cutting about 1 in. deep. Then he makes an opening at one end and breaks out the concrete in chunks, working back from the opening. If the pavement is reinforced, the work is increased. Common practice is to cut the reinforcement 6 to 12 in. from the side of the cut, so that it will lap over a new sheet cut to fit the opening when the concrete is replaced.

The edges of the pavement opening should be trimmed so that the top 2 in. are vertical and the upper edge is not rounded or seriously chipped.

Only well-graded 0-¼-in. sand and well-graded ¾- to 1½-in. crushed stone or gravel should be used. The mix should be so dry that the mortar will just form a ball when squeezed in the hand (4 to 5 gal. of water per sack of cement).

The following procedure is good practice: (1) Place concrete in patch, leaving it about ½ in. above level of surrounding pavement; (2) tamp thoroughly, using end of a 2x4-in. plank, then lay a 2x12-in. plank over the patch, projecting onto the adjacent pavement, and tamp on the plank with a 12-lb. sidewalk tamp; (3) retamp three times at 15-min. intervals, or retamp once 45 min. after first tamping; (4) strike off with a straight-edge resting on the adjacent slab and held parallel to the center line of the pavement, being sure that the surface of the patch is at exactly the right elevation; (5) finish with a belt or wood hand float to have the same surface texture as adjacent pavement; (6) place barricades to keep traffic off patch; (7) cover the patch with wet earth or other approved curing agent. Keep the earth wet until the patch is opened to traffic.

Costs in the twenty cities reporting vary from $1.50 to $2.50 per square yard in Seattle and $1.72 in Norfolk to $11.25 for complete replacement of an 8-in. slab in Detroit. Eight cities reported less than $3, and the average was $4.74. Washington contracts the work at $2.44. Eight other cities and two of the above charge for making the cut and replacement.

In a comprehensive paper on low-cost, bituminous-treated roads, W. H. Rhodes, Shell Petroleum Corp., urged this type of highways for use in the outskirts of cities. R. M. Douglas, consulting engineer, Pittsburgh, in his paper on brick pavement design held that mastics as now used still need improvement. He still regards a 1-in. sand cushion and a squeegeed hot asphalt filler as being the best combination. Thinner brick than 3 in. he believes can be used to advantage.

Aggregate Sampling—The producer and the engineer view aggregate sampling quite differently, stated Herbert F. Kriege, in charge of tests for the France Stone Co., Laboratories, Toledo, O. Points raised against the standard methods employed by engineers are as follows: quantities taken are too small; the personal element should be eliminated; selection at random places a premium on the personal element and should be replaced by quartering or riffling. Mr. Kriege severely criticized engineers who carefully examine pits, banks and quarries in an attempt to establish stratification irregularities and to discover the presence of undesirable materials. The engineer should be interested, said Mr. Kriege, only in the fitness of the finished product, unless he wishes to buy a quarry and start in on the problems of aggregate preparation. The most satisfactory method of sampling is to cut through the stream of aggregate as it is being loaded from the bin to the car with a 4x6-ft. heavy canvas, taking two or three 100-lb. samples and dividing them down to 30 or 40 lb.

Water and Sanitation

For two sessions water, sewage, garbage and refuse were discussed in papers and reports, bringing each branch of sanitation to date with careful resumés of the present status and trends.

Water—L. R. Howson, consulting engineer, Chicago, as chairman of the committee, presented a symposium of papers on water treatment and lessons from the drought. John R. Baylis reviewed in detail the latest taste-and-odor-removal methods, which indicate that tastes and odors can be removed if a city is willing to pay the cost.

D. E. Davis, in describing the zeolite process of softening, gave operating results of the six-year-old plant that treats the well supply of the Pittsburgh Suburban Water Co. on Neville Island. This 4-m.g.d. plant reduces the hardness to 60 p.p.m. A second plant, of 2-m.g.d. capacity, for the Borough of Sewickley, also uses a green sand zeolite and reduces the hardness in the water taken from a crib sunk in the sand beneath the Ohio River from 223 to 65 p.p.m., as a monthly average from February, 1929 to date. A total of 1,345 tons of regenerating salt has been used for the total pumpage of 768 m.g. The

monthly salt dose averaged 0.378 lb. per 1,000 grains of hardness removed and varied from 0.279 to 0.425 lb. The capacity of the mineral in hardness removal per cubic foot has approximated 3,610 grains. Salt cost $8.50 per ton, or $1.61 per m.g. of hardness removed.

N. T. Veatch, Jr., in speaking of drought lessons, indicated that few plants had suffered where an ample factor of safety had been used in designing capacities and where the requirements of good design had kept pace with population and demand increases.

Sewage—A. P. Learned, consulting engineer, Kansas City, outlined the present status of sewage treatment as his report on the subject and recommended for next year an exhaustive study of the uses of gas produced at treatment plants.

John H. Gregory, consulting engineer, Baltimore, in discussing a paper by E. B. Besselievre, Dorr Co., on "Mechanical Handling of Sewage Solids," exhibited examples of filter cake obtained from a vacuum-filtered digested sludge. The sludge was conditioned with ferric chloride (8 to 100 lb. of dried solids) and produced a cake about ¼ in. thick. Experiments that look promising at Baltimore and Columbus are now being made. If successful, this means elimination of the sludge-drying bed. The experiments will include burning sludge in an incinerator.

The Fostoria trade-waste problem, long a difficult one at the sewage-works, seems to have been solved satisfactorily by part elimination of the wastes from a wire mill and carbon-works. J. F. Laboon, J. N. Chester Engineers, Pittsburgh, whose firm has long been employed at Fostoria, presented an exhaustive report on the situation, covering the period from the installation of septic tanks in 1896 to date.

M. W. Tatlock, superintendent of the sewage-treatment works at Dayton, Ohio, in discussing a review of the lime-chlorine process by W. V. Brumbaugh, National Lime Association, gave results of the process used for 74 days this last season to eliminate hydrogen sulphide odors. This Imhoff tank plant is located between a golf club and a park. About 1 ton of chlorine and 1¼ tons of hydrated lime were applied to the raw sewage per day. The chlorine averaged 11 p.p.m. The volatile sulphides were eliminated but not the organic load. Biochemical-oxygen demand, sludge and skimmings were reduced but not the quantity of gas, which is extensively used for power and heating. Mr. Tatlock estimates an extension of the plant will be put off for as much as ten years.

Activated Sludge—Based on observations made at the Milwaukee sewage-treatment plant, a number of the settling characteristics of activated sludge were discussed by Darwin W. Townsend, principal assistant engineer of the Milwaukee sewerage commission. The most undesirable and troublesome condition encountered in the settling of activated sludge is that of "bulking." This condition retards precipitation and appears to be most likely to occur during low temperature periods. The sludge floc is relatively light, fluffy and without sufficient density to cause effective precipitation. It is assumed that retarded biological activity is largely responsible. At Milwaukee bulking has been checked by the use of increased quantities of air in the aeration process.

Observations on settling in glass cylinders reveal that it proceeds in three stages: general coagulation of the entire mass, flocculation and slow precipitation of detached floc particles, and gradual descent of finely divided particles. The concentration of the settled material is brought about by the extremely mild force of its own weight, and can be aided by the moderate squeezing action imparted by rotating scrapers.

The author believes that in settling-basin design the detention period should be based on only the upper or clear-water zone, about half the depth, and in the remaining sludge zone the sludge-withdrawal rate should determine the sludge-detention time.

Refuse and Garbage—E. E. Butterfield, chairman of the committee on refuse disposal and street cleaning, reviewed the refuse situation, referring to the report on garbage in 23 cities by the civic development committee of the U. S. Chamber of Commerce, and the slight trend toward utilization of the heat units in garbage by steam production. A Ford 60,000-kw. plant in England is to be fueled by mixed garbage and refuse. In a paper by Dr. Butterfield on "Factors in the Economies of Waste Disposal," he discussed particularly the efficiency of combustion and heat-transfer equipment and the economical balance between process steam and power. Storage of pre-dried garbage to permit continuous operation is essential to successful utilization of this low-grade fuel.

Municipal Finance

An appeal for physical and financial planning as the proper basis for floating bond issues was the keynote of a paper on "Budgeting and Rationalizing Municipal Bond Issues," by Morris Knowles and Nathan B. Jacobs, consulting engineers, Pittsburgh. The paper pictured the conflict between extension of municipal services and reduction in taxation, and showed that in cities where long-term financial plans were in force, city officials were best equipped to meet these diametrically opposed demands. The paper estimated at 12 billion dollars the municipal, state and county bonds outstanding, including 1 billion dollars worth of bonds floated in 1930.

The types of abuse to which the municipal bond business is subject were cited: bonds not legally valid, bonds issued for terms in excess of the useful life of the improvements they financed, and improper statements of the financial condition of the political unit offering the bonds. A number of years ago a leading authority compiled a list of 249 municipal bond issues held illegal after being issued. The year 1930 was held notable for the number of municipal bond issues defaulted. Out of a municipal bond debt of $600,000,000 in Florida, it was estimated that more than $200,000,000 was in default as to principal or interest at the end of 1930.

The purpose of the financial plan was defined as the stabilization of the fiscal demands for capital expenditures. Cincinnati was cited as an example of successful coordination of physical and financial planning. The execution of such planning is properly the work of engineers, and the authors appealed to them to recognize their obligation in the problem.

Clarence E. Ridley, executive secretary, International City Managers' Association, presented a paper on "The Other Side of the Public Works Budget," and explained in detail the work of the committee on uniform street-sanitation records. The first installation of such records was made at Brunswick, Ga., and it is planned to distribute the forms to 800 other cities. Mr. Ridley stated that it was the most outstanding development in a decade in determining work done in terms of money expended.

Frank A. Marston, of Metcalf & Eddy's office, Boston, described methods used in assessing costs of sewers by the frontage, area, general tax and annual rental basis. A combination of the frontage, area and general tax methods was held to be the most equitable.

Mobilizing Public Works for Employment

Plans and experiences of different cities reported at convention of Municipal Engineers—Both scrip and money payment prove successful

EXPERIENCES in utilizing local public work to make jobs for the unemployed were discussed in a special session of the American Society of Municipal Engineers at Pittsburgh on Oct. 23. The leading speakers were Charles M. Reppert and Major Philip S. Matthews for Pittsburgh, George Welch for Grand Rapids, C. A. Poole for Rochester, and Miss Joanna C. Colcord for the Russell Sage Foundation, which has made an extensive study of relief work plans.

"Jobs Instead of Doles"—Mr. Reppert, chief engineer of the Pittsburgh department of public works, detailed the operation of the Pittsburgh plan (*ENR*, April 23, 1931, p. 692), a plan that uses private contributions in combination with public funds through cooperation of the Allegheny County Emergency Association with the various public authorities in the region. Essentially, the speaker stated, it is philanthropic relief work conducted on the principle "Jobs Instead of Doles."

More than a million dollars was spent last winter, two-thirds of this being money collected from individuals and corporations. About 1,400 men were put to work. For the coming winter a program of $1,500,000 has been laid out by the city of Pittsburgh alone. Relief-work operations will begin next week, and the initial force of several hundred is to be increased to at least 2,000 shortly. Following last winter's plan, the association will provide and pay for common labor, while the cities, boroughs and counties will provide materials, supervision and skilled labor. The average ratio of expenditures last winter was $2 by the association to $1 by the public authorities, though on some projects the ratio was as high as 3:1.

In last winter's work, projects were selected with a view to maximum use of common labor. Though the labor was not as efficient, "The work on the whole was on a true engineering basis; the foundation of the Pittsburgh plan is economical performance," Mr. Reppert said. A large mileage of dirt streets was improved, relief sewers, concrete stairs and retaining walls were built, curve guards on roads, park road pavements, and a large water main were constructed.

Wages were $4 for eight hours. Men worked in alternating shifts and averaged $50 income per month. Some foremen were borrowed from contractors, at reduced wage rates ($8). Foremen were free to discipline and discharge. Rigid accounting was found important. Every effort was made to avoid confusing charity cases with workmen.

Two Winters in Grand Rapids—George Welch, city manager reported that Grand Rapids began relief work in the winter of 1929-30, and though hampered by the after-effects of accumulated deficits in the city finances succeeded in providing much relief work in that season, chiefly on snow removal and some water-main construction. At the end of that season the problem was studied more thoroughly for the 1930-31 winter. An emergency clause in the city charter made it possible to raise $650,000, to be paid back in three years, and with this the next winter's operations were conducted. Grand Rapids has tried to build a system under which no man who comes for relief will fail to get it, said the speaker. The situation of last winter, and still more that of the coming winter, is not one of ordinary relief but an entirely new problem, where men who have always been self-supporting citizens need to be given work.

Finding work of such kind as to require little but labor was at first a matter of the ingenuity and vision of department heads; later a special engineer was assigned the task. Many improvements that had never been able to receive authorization were taken up, and many of these were little more than wheelbarrow-and-shovel jobs (*ENR* Oct. 15, 1931, p. 612).

"The best thing we did was to put an accountant in the welfare department," Mr. Welch declared. Classification of applicants (heavy work, light work, relief), an effective assignment and control system, payment by scrip (now down to 20c. units), a wage rate of 50c. per hour (later reduced to 40c.) absence of politics, and complete centralization and coordination were features of the system. Men with several children were given more work than those with one child. Single men were assigned a large bunk house, where they built bunks and set up a kitchen and other living and service equipment. City stores sold necessaries for the scrip issued in payment for work. In all, 2,700 men were put to work.

Some Conclusions From Experience—Miss J. C. Colcord, director of charity relief of the Russell Sage Foundation, New York, emphasized the importance of the social viewpoint. Engineers and city officials may make serious errors if they fail to utilize the experience and some of the methods of trained social workers.

There is no doubt of a great increase in work relief this winter over last, she said. More than 100 cities will take up such work this winter, as compared with barely a score last winter. Only a few cities are giving up work relief for lack of success last winter. Miss Colcord distinguished between increased public-works volume and relief-work construction. In the former the contractor selects his workers, while in the latter the workers must be selected according to need as well as by qualifications. As the essential objective is maintenance of public morale, methods that are destructive of morale, as handling the work applicants by breadline procedure, miss the effect sought for.

A most important service of work relief is to help those who are just on the verge of going into the relief class. They are best helped if the relief-work program is small and if they are placed among other workers. Pay should always be in cash. It is advisable to cooperate with labor unions and set constructive wage rates; it is better to pay a proper wage rate and cut down the days worked per week. In some localities the low relief-work wage rate had the effect of cutting down prevailing wage rates. The efficiency of relief work is likely to be rather low; figures of 40 and 50 per cent were obtained from two reporting cities.

Investigation of applicants is vital, and those who do not need work must be kept out. Experience in certain cities was cited to show the ruinous effect of inadequate planning, absence of centralized control, political influence, unskilled investigation, lack of medical supervision (resulting in fatal accidents soon after employment) and other errors that might have been avoided by drawing on the facts of social work. She also stressed the necessity of handling relief labor like other labor, i.e., discharging the workers for faults or inefficiency. Workers should also be discharged if they fail to use their pay for support of their families.

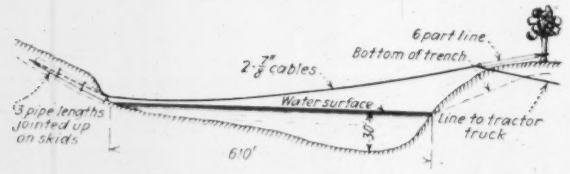
FROM JOB AND OFFICE

Hints That Cut Cost and Time for the Contractor and Engineer

Cast-Iron Pipe River Crossing Installed Without Special Equipment

WHEN the Endicott Water Co., of Endicott, N. Y., agreed to supply 300 consumers in the village of Vestal, on the opposite bank of the Susquehanna River, it was necessary to lay a 10-in. class C cast-iron pipe across this stream at a point where it is 610 ft. wide and has a maximum depth of 30 ft. This crossing was installed by five men in three working days, using equipment available in the water company shops.

The method used was very simple. The north bank was trenched out to provide a gradual slope leading into the water. Timber cradles or skids long enough to accommodate three lengths of pipe were placed in the bottom of the trench and the joints poured. Then an old $\frac{7}{8}$-in. cable was stretched across the river, passed through the interior of the section and fastened to a steel bar placed transversely across the face of the rear length. At the south bank, this cable was connected to a block and tackle with a six-part line anchored to a convenient tree. Towing the free end with a tractor truck moved the section ahead three pipe-lengths, after which three more pipes were added, the cable pulled back and the process repeated. No trench was excavated in the gravel bottom of the river, as this was not considered necessary.



Method of placing water main across river

To facilitate movement the skids upon which the pipe rested were greased, and a $\frac{3}{8}$-in. curved plate with an upturned nose was fastened to the front end of the section by two circumferential iron straps. An important precaution was the provision of a $\frac{1}{2}$-in. rope paralleling the drag cable; the value of this became apparent when, during the course of the job, the old $\frac{7}{8}$-in. cable parted. The two pieces were recovered, spliced and then pulled back into position with the rope; had the latter not been in place the delay would have been more serious. After the accident a second length of cable, the only new piece of equipment used, was installed to take part of the load.

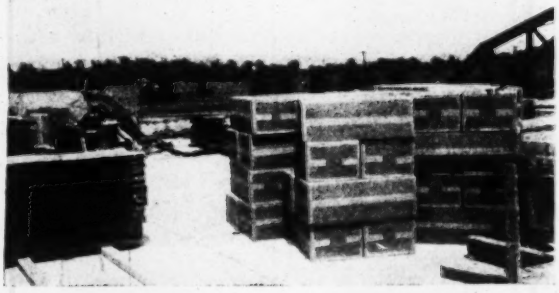
When the head of the pipe was approaching the south bank the tackle anchorage was shifted downstream to throw a curve into the crossing. By bowing the pipe about 10 ft. at the maximum ordinate the entire line is subjected to compression by the action of the current.

At the conclusion of the work the crossing was tested both with compressed air and with water at a pressure of 140 lb. per sq.in. (service pressure is 110 lb.). No serious leaks could be detected in fact, the water test showed a loss of only 14 gal. in the 48-hour test period. Joints were of the metropolitan type, poured with Leadite. The crossing has now been in service over three years and is giving perfect satisfaction, according to Earl J. Grippen, superintendent, who devised the method used in placing the pipe.

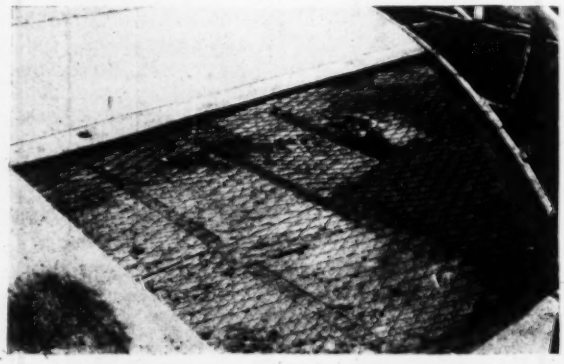
Light-Weight Floor Fill Formed by Empty Cardboard Cartons

LARGE cardboard cartons were used in place of cinder fill in building concrete covers for the 85-ft.-diameter digestion tanks at Toledo's new sewage-works. The framing of the tank covers consisted of steel I-beams incased in concrete. The total depth, including the casing, is 28 in. The cover serves to collect the gas generated by the digesting sludge, and because of this function the 5-in. concrete slab is framed into the bottom of the beams. The 23-in. space between the top of the slab and the top of the beams was originally designed to be filled with 20 in. of cinders and 3 in. of concrete. To avoid the use of the cinders the contractor suggested that empty cardboard cartons be used instead.

The cardboard was delivered in sheets cut to the proper dimensions and made up into the cartons on the job. Division plates or baffles were placed in each carton to divide the air spaces into small units and to reinforce the cartons, which are 24 in. wide, 18 in. deep and of vary-



Sheets of cardboard are made into cartons on the job



Cartons laid on concrete slab with 3-in. walls between
A 3-in. reinforced slab is then placed on the cardboard fill.

ing lengths to fit the shape of the tank. They were placed on a 2-in. layer of crushed stone spread on the slab, with 3-in. spaces between adjacent boxes. These spaces were filled with concrete, after which 3 in. of concrete, reinforced with expanded metal, was placed on top of the boxes. The contractor is A. Bently & Son, of Toledo.

Simplified Adjustment of a Quadrilateral

By WALTER D. MYERS
Pennsylvania Water & Power Co., Baltimore, Md.

IN TRIANGULATION the use of quadrilaterals, rather than of a series of adjacent triangles, offers a greater degree of accuracy in proportion to the effort spent in office work. Through the use of a method developed by the Pennsylvania Water & Power Co. the adjustment of errors of observation is reduced to a comparatively simple problem requiring considerably less labor than the usual method involving the use of logarithms. All calculations, including interpolation to tenths of a second, can be made without the use of scratch paper on a ten-bank calculating machine. A typical computation sheet is shown in Fig. 1. The method corresponds to the approximate adjustment rather than to the rigorous adjustment by least squares, but this is sufficiently accurate for most work.

In a typical quadrilateral, such as is shown in Fig. 1, the opposite vertical angles formed by the diagonals must be equal, which means that

$$a + b = e + f$$
$$c + d = g + h$$

Furthermore, the sum of the interior angles of the quadrilateral must total 360 deg. The angle adjustment, therefore, can be made by distributing the errors equally, as shown at the top of the computation sheet.

Fig. 1—Form sheet for quadrilateral adjustment

Angular adjustment, however, is not final; reference to Fig. 2 shows that a quadrilateral may satisfy the conditions stated and still not close. If a semi-diagonal such as AO is multiplied successively, in passing around the figure, by the sine of the first angle and divided by the sine of the second, multiplied by the sine of the third, etc., the figure will close ($AO = A'O$) only when

$$\frac{\sin a \times \sin c \times \sin e \times \sin g}{\sin b \times \sin f \times \sin d \times \sin h} = 1$$

Adjustment is made without disturbing the interior vertical angles, which means that a small angular correction must be added to each of the angles in the numerator and subtracted from each of the angles in the denominator. The method of adjustment is illustrated on the lower part of Fig. 1. The discrepancy between $A'O \div AO$ and unity is distributed in proportion to the cotangents of the angles. Multiplying the proportion of the error distributed on each angle by its sine gives the amount to be added to or subtracted from the sine. Inasmuch as the distributed error is in proportion to the cotangents and is in turn multiplied by the sine, the actual amount added to or subtracted from the sine is proportional to the cosine of the angle. Since this is proportional to the tabular difference, the angular correction added to or subtracted from each of the eight angles is constant.

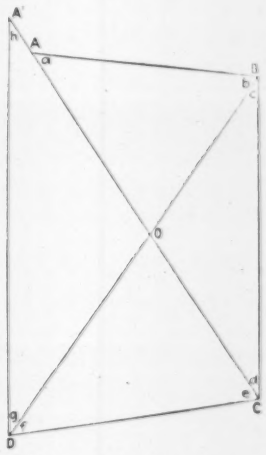


Fig. 2—Sides, as well as angles, require adjustment

The final sines given in the uppermost and lowermost lines of the computation are used in the calculation of the sides, using the sine law. In the example given, the side Gren-Tres is the side of known length from which the other sides are computed. The length of the line Lant-Star as computed through two sets of triangles is found to be exactly the same, thus showing that the angles are perfectly adjusted and that there is no mistake in calculation.

Steel Pipe Rolled After Welding

THE NEW storm sewer outlet into the Grand River at Grand Rapids, Mich., is composed of three lines of 54-in. diameter arc-welded steel pipe, the fabrication of which involved the unique practice of welding the longitudinal seam while the curved steel plate was still in the rolls and then continuing the rolling to straighten the seam and insure a true cylindrical section. Each pipe section was rolled from a $\frac{3}{8}$-in. plate 17 ft. long and $8\frac{1}{2}$ ft. wide. Welds high in strength and ductility are required to withstand this method of fabrication without damage.

After removing the pipe from the rolls, two sections $8\frac{1}{2}$ ft. long were butt-welded together to form a field section. Circumferential field joints were welded from the inside of the pipe. According to the Lincoln Electric Co., whose process and machines were used by the

Sewer outlet of arc-welded pipe at Grand Rapids, Mich.
In fabricating this pipe the longitudinal seams were welded while the plates were in rolls, after which rolling of the welded pipe was continued until a true cylindrical section was assured.

fabricator and contractor, the Leitelt Iron Works of Grand Rapids, the possibility of corrosion of such welded joints from electrolytic action between the parent metal and the metal in the weld, especially if the latter is highly oxidized during its placement, led to the adoption of a shielded-arc process of welding that excludes both oxygen and nitrogen from the weld.

LETTERS TO THE EDITOR

Calcium Hypochlorite in Water Purification

Sir—In your report of the paper delivered by J. D. MacMahon at the annual convention of the New England Water Works Association (*ENR*, Oct. 8, 1931, p. 577) you say: "This dealt with the use of calcium hypochlorite, a chemical said to be more efficient than calcium chloride." Calcium chloride was not mentioned in this paper and, so far as we know, has no use whatsoever in water purification. You will, therefore, realize that such a comparison not only is erroneous but is entirely misleading. What Mr. MacMahon actually stated was that calcium hypochlorite is more efficient than chloride of lime, often called bleaching powder. We feel certain that you will wish to rectify this statement.

WALTER L. SAVELL,
Technical Adviser, Sales Department, Mathieson Alkali Works, Inc.

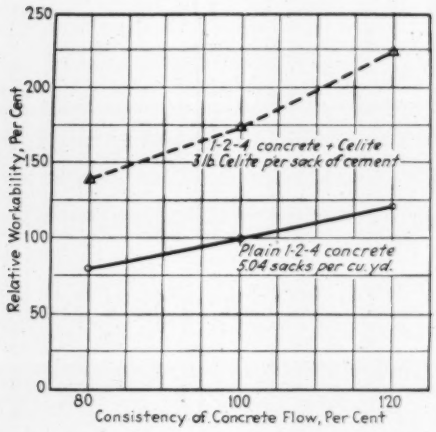
New York City,
Oct. 14, 1931

Controlling Concrete Consistency

Sir—An article by T. C. Powers (Sept. 3, 1931, p. 368) points out the need of maintaining the consistency of job concrete because a variable consistency due to variable moisture in the sand affects the workability, the yield and the quality of the concrete.

In my studies to determine the effect of Celite in improving the workability of concrete and in determining the relative merits of various admixtures I have observed that the workability varies with changes in consistency. In order that variable consistency would not enter to affect determinations, it has been necessary to keep the flow as nearly constant as possible. Variations of 1 to 2 per cent in the water content, other conditions being constant, is sufficient to vary the consistency a noticeable amount.

The curves herewith show the relative workabilities of plain and Celite concrete as determined with the improved



penetration apparatus. The range of flow shown corresponds to slumps of about 5 to 8 in. On the basis of the water used to give the low flow the higher flow required about 7 per cent additional water. It will be noted that there was an appreciable change in the workability with change in consistency, for both plain and Celite concrete. The yield on the basis of mixed aggregate varied with the consistency from 1.052 to 1.061 for the plain concrete and from 1.070 to 1.091 for the Celite concrete.

Prof. D. A. Abrams has pointed out that the correct determination of the consistency becomes a condition precedent to proper testing and is the most important feature of concrete investigations. If this is the condition in the laboratory, and it unquestionably is, equally careful control in the field should be a vital consideration. Mr. Powers in emphasizing the importance of this has presented a table of correction values to be applied at the mixer to compensate for variations in yield and consistency due to variations in moisture content of sand. In spirit I concur with Mr. Powers, but I wish to point out that a variation of 7 gal. of water, about 6 per cent, is sufficient to cause a change in flow nearly equal to that shown in the above figure and would have a small effect on the yield—about 1 per cent. Other things being equal, only one consistency can be obtained with a given quantity of water. The total weight of the batch should therefore be constant and the total water content the same regardless of the moisture in the sand. With variable moisture in the sand the only requirement necessary to produce given weight proportions is to adjust the correction values so that the weight of dry sand and the total volume of water used is constant. In the following table, which is similar to that of Mr. Powers', I have shown the proper corrections computed by the equation:

$$x = \frac{3{,}800}{95 \pm y} \times 100$$

where x = gross weight of moist sand to be used.
y = percentage variation in moisture.

Per Cent by Wt. Dry Sand	Moisture	Gross Wt. of Sand Plus Water	Water Weighed in With Sand Lbs.	Gal.	Total Water in Mix*	Corrections Water, Gal.	Moist Sand, Lb.
95+5	0	3,800.0	0	0	114.0	+24.0	−200.0
95+4	1	3,838.4	38.4	4.6	114.0	+19.4	−161.6
95+3	2	3,877.6	77.6	9.3	114.0	+14.7	−122.4
95+2	3	3,917.5	117.5	14.1	114.0	+ 9.9	− 82.5
95+1	4	3,958.3	158.3	19.0	114.0	+ 5.0	− 41.7
95+0	5	4,000.0	200.0	24.0	114.0	0.0	0.0
95−1	6	4,042.6	242.6	29.1	114.0	− 5.1	+ 42.6
95−2	7	4,086.0	286.0	34.3	114.0	−10.3	+ 86.0
95−3	8	4,130.4	330.4	39.6	114.0	−15.6	+130.4
95−4	9	4,175.8	375.8	45.1	114.0	−21.1	+175.8
95−5	10	4,222.2	422.2	50.7	114.0	−26.7	+222.2

*Basis: Correct net weight of dry sand equals 3,800 lb. 90 gal. of water in addition to that carried in 4,000 lb. of sand containing 5 per cent moisture.

From this it is seen that the weight of dry sand is constant and that the total volume of water remains unchanged. It will also be seen that the moist sand correction is constant at 8.33 lb. per gallon of water removed or added. This is as it should be, since for given conditions the total weights of the batch should be unchanged.

GEORGE A. SMITH,
Concrete Research Engineer, Johns-Manville Corporation.

New York City,
Sept. 17, 1931.

NEWS OF THE WEEK

Wage Decision Holds Up Payments in Chicago

The prevailing-wage law of Illinois having been declared unconstitutional by the state supreme court (*ENR*, Oct. 22, p. 668), the department of public works and buildings is now arranging to let contracts for a large amount of work on highways, bridges and buildings.

A less favorable result of the court decision is that the Sanitary District of Chicago is reported as deciding to make no more payments on contracts let under the prevailing-wage law until an investigation has been made as to their validity. If these contracts are found to be invalid, bids may be advertised for the completion of the work involved. These contracts are said to represent a total of about $5,000,000.

A labor clause now inserted in proposals for bids on road work by the Illinois division of highways since the court decision reads as follows: "So far as is practicable, contractors will be required to employ Illinois labor residing in the vicinity of the work. Contractors should figure on a fair scale of wages in preparing bids on this work."

Bids Opened for U. S. Supreme Court Building

A meeting of the Supreme Court Building Commission will soon be held to award the contract for the superstructure of the new supreme court building. The opening of bids for the work disclosed that the George A. Fuller Co., of Washington, was the low bidder, at $8,383,000. The second low bid, $8,500,000, was by the Jacobson Brothers organization of Chicago. An appropriation of $9,740,000 is available. The foundation work has been completed at a cost of $150,000.

Work Stopped on Tunnel Under the Lachine Canal

Work on the tunnel under the Lachine Canal in Montreal has been stopped by order of the executive committee and will not recommence until the city council votes $1,034,964, the total claims of the contractor for supplemental works connected with changes in design and unexpected soil conditions. The total cost of the tunnel, orginally set at the limit of $2,556,000, has now been increased to $3,590,964. The Montreal Technical Commission has recommended that the extra claim be included in the estimate and the work proceeded with immediately.

Proposed Contract for Imperial Dam Meets Opposition

OBJECTIONS presented at a hearing Oct. 22 before Secretary of the Interior Wilbur were not of a character that promise to the Palo Verde Irrigation District and other protestants any change in the draft of the government's contract with the Imperial Irrigation District for construction of Imperial Dam (upper site) and the All-American Canal. At the hearing the Palo Verde District contended that specific provision should be made in the contract whereby the Imperial Irrigation District would assume direct liability for any damage done by back-water to the Palo Verde District as a result of the construction of Imperial Dam.

Representatives of the Palo Verde District argued that with no definite procedure under which the district could obtain redress the clause in the contract providing that the Imperial District will save the United States harmless from any loss or damage incurred in executing the project does not assure the Palo Verde District of sufficient protection. Secretary Wilbur conceded that in any adjudication of claims for damage the interior department could not actually award any money to the Palo Verde District without an act of Congress. Representatives of the Imperial District contended that the provision now embodied in the proposed contract constitutes an agreement that the Imperial District will pay damages resulting from construction of the dam.

Effect of Hoover Dam

M. J. Dowd, engineer of the Imperial District, admitted that there has been much controversy concerning the probable action of the river following construction of Hoover Dam. He expects, he said, that with 95 per cent of the silt removed at Hoover Dam, the average grade of 1½ ft. per mile between the new diversion dam and Palo Verde will drop to 1 ft. or less. It was his contention that Palo Verde eventually will have to build a diversion dam and that any effect of the Imperial Dam will be toward a saving in cost of a dam at Palo Verde.

In addition to their objection regarding the damage clause of the contract, the representatives of the Palo Verde District also protested against any limitation upon the alienability of their water rights. The district has no present intention of selling water, according to their representatives, but fears that with changes in the river caused by Hoover Dam it will eventually become

(Continued on page 708)

Injunction Sought to Prevent Construction of Dotsero Cutoff

A suit to prevent the Denver & Rio Grande Western Railroad from purchasing the Moffat Railroad and building the Dotsero cutoff has been brought in Wilmington, Del. The suit is brought by the Moffat Tunnel League, a voluntary association of Steamboat Springs, and the Uintah Basin Railroad League, a voluntary group of Utah men. It seeks an injunction to restrain the Rio Grande, a Delaware corporation, from carrying out the order of the Interstate Commerce Commission.

The petition asks that the Rio Grande be restrained from proceeding with acquisition of the Moffat road and that the commission's order of Feb. 1, 1930, authorizing the acquisition through stock purchase, be declared illegal, on the ground that the Interstate Commerce Commission held no hearing to ascertain if acquisition of the road was for the public interest.

Before the commission's final order was entered on Sept. 15, the Rio Grande agreed to begin work on the Dotsero cutoff in six months and complete it in two years, and to pay $155 a share for all Moffat road stock offered in the succeeding six months.

Ontario to Build Highway to Aid Unemployment

The Ontario department of highways is calling for bids for the construction of a highway from Madoc to Perth, 70 miles, as an unemployment relief measure on which it is proposed to employ about 1,500 men, the cost to be borne jointly by the dominion and provincial governments. The section through which the road will pass is almost virgin territory sparsely populated and thickly wooded. The cost of the road, together with that of another road from Belleville to Actinolite, will be about $1,000,000. The Madoc-Perth road will reduce the distance from Toronto to Ottawa by about 45 miles.

Quebec to Spend $5,350,000 for Unemployment Relief

The Province of Quebec will receive from the dominion government $4,650,000 as its share of the money appropriated for the relief of unemployment by the construction of public works and $700,000 for direct relief. The dominion government will bear half the expense of the public works to be constructed, the province contributing 25 per cent and the municipalities concerned 25 per cent. The plans for the proposed undertakings must be approved by the dominion authorities.

Test Borings Begun for Oakland Bridge

The contract for drilling test borings to determine pier foundation locations for the San Francisco-Oakland bridge, to be constructed across San Francisco Bay, has been awarded to the Duncanson-Harrelson Co., San Francisco, on its low bid of $63,600. Work will be started immediately.

Engineers Honored by American Society of Civil Engineers

Four members of the American Society of Civil Engineers were elected to honorary membership in the society by the society's board of direction at its meeting in St. Paul early this month. The engineers so honored are: George W. Kittredge, retired chief engineer of the New York Central Railroad system; Daniel W. Mead, professor of hydraulic and sanitary engineering at the University of Wisconsin; George H. Pegram, chief engineer of the Interborough Rapid Transit Co., New York; and Palmer C. Ricketts, president, Rensselaer Polytechnic Institute, Troy, N. Y.

The addition of these four names to the list of honorary members of the society brings the list to eighteen. The other honorary members are: Onward Bates, Edwin A. Fisher, John R. Freeman, Baron Koi Furuichi (Japan), Herbert Hoover, Gustav Lindenthal, Charles D. Marx, Wm. Barclay Parsons, Charles P. E. Schneider (France), J. Waldo Smith, John F. Stevens, Ambrose Swasey, Arthur W. Talbot and William C. Unwin (England).

The society has recently lost two honorary members by death, George F. Swain and Howard A. Carson.

New York State Sewage Works Association Meets in Ithaca

The fall meeting of the New York State Sewage Works Association was held at Ithaca, N. Y., Oct. 16-17, with a total registration of 96.

Glenn D. Holmes read a paper describing the experimental work, design and actual tank performance at Syracuse, N. Y., and this was followed by a symposium on stream pollution, participated in by Profs. Chamot, Needham and Claassen, of Cornell University, and Emmeline Moore, of the New York state conservation department.

Inspection trips were taken to the Ithaca sewage-treatment works and the university water-purification plant.

At the dinner Dexter S. Kimball, dean of the engineering college, Cornell University, outlined the past and present status of the sanitary engineer. Following the dinner C. H. Capen, of West Orange, gave a paper with lantern slides on "Camouflaging Sewage-Treatment Plants" and Prof. W. C. Taylor, of Union College, opened a discussion on "Measuring Devices in Sewage-Treatment Plants."

The fourth annual meeting of the association will be held in New York City on Jan. 19.

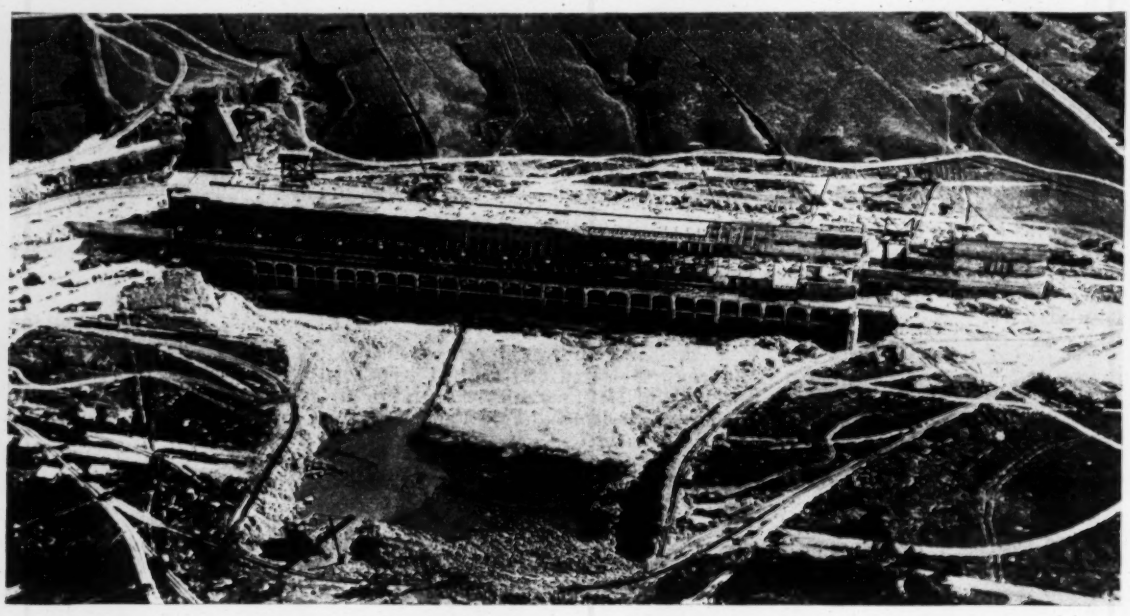
Mississippi Levee Work Shows Unusual Progress

Unusual progress was made in the construction of levees on the lower Mississippi during September, a report from the Mississippi River Commission shows. During the month 11,067,950 cu.yd. of material was added to the levees. This compares with 9,782,571 cu.yd. in August and exceeds the monthly average of the record-breaking fiscal year ended June 30 by 3,660,091 cu.yd. Notable features of the September work were the placing of 2,105,337 cu.yd. in the levees of the lower Yazoo River and the addition of 1,105,949 cu.yd. to the levees in the Pontchartrain district.

At the end of September the Bird's Point-New Madrid levees were 94.5 per cent complete.

Rutgers University Announces a Waterworks School

Rutgers University announces a short course for filter plant operators and waterworks superintendents to be held at the university Dec. 7 to 19, under the direction of the college of engineering in cooperation with the South Jersey Association of Water Superintendents and the New Jersey state board of health. The course of study has been planned to provide instruction in the fundamental principles of waterworks management and maintenance and filter plant operation.



BEAUHARNOIS POWER HOUSE TO BE CLOSED IN BEFORE WINTER

Rapid progress is being made on the power house of the Beauharnois hydro-electric plant on the St. Lawrence River above Montreal. The initial installation will be two units of 8,000 hp. each and four units of 50,000 hp. each; the next step will be the addition of six more 50,000-hp. units. The power house, as shown here, is being built with space for still more units, the wall passages for the future extensions being used as sluiceways temporarily. In the foreground the tailrace is excavated in solid rock out to Lake St. Louis, using an 8-cu.yd. electric shovel. A canal will bring water from Lake St. Francis to a forebay directly behind the power house.

Wage Scale to Be Maintained in San Francisco Bay Area

Maintenance of the present daily wage scales in the building industry of San Francisco and Alameda counties, Calif., during 1932 has been ordered by the impartial wage board, appointed to survey conditions in the building trades and recommend wage scales in the San Francisco Bay area. The important features of the findings of the board are: (1) present wage scale to remain in effect during 1932; (2) official working week of five days; (3) working day to remain at eight hours; (4) overtime to be paid at the rate of time and one-half; (5) work on Saturdays, Sundays and holidays to be paid at double rate; (6) actual emergency and repair work to be registered and may be performed outside regular working hours in eight-hour shifts; (7) employment of improvers or helpers, except by official designation, to constitute violation of award; (8) ratios of journeymen and apprentices to be worked out cooperatively by employers, union representatives and the Industrial Association.

The board recommended that steps be taken for adoption of an official six-hour day and urged that an effort be made to reduce building costs.

The present wage scales, which will remain effective in 1932, range from $5.50 a day for common laborers to $11 a day for bricklayers, ironworkers and plasterers. Carpenters and portable and hoisting engineers receive $9 a day, and auto truck drivers (less than 2,500 lb.) get from $6 to $7.50 a day.

First Unit Started of Federal Base on West Coast

Construction has been started on the $5,000,000 federal base on Government Island, near Alameda, Calif., for the Coast Guard, federal Bureau of Roads, Forest District headquarters and other government offices. The first unit of nine buildings will be constructed with the $800,000 funds now available. The second unit of the project calls for channel widening by cutting away a 200-ft. strip of Government Island property and the erection of a modern dock, running parallel with the shore line. Capt. A. B. Brown is engineer in charge.

Quebec's Road Improvement Program

The Province of Quebec has launched a huge road improvement program involving $15,000,000. Through the cooperation of the federal and the provincial governments $5,000,000 will be spent immediately on the trans-Canada highway in the province and on provincial and regional roads. This amount is in addition to the metropolitan boulevard, which will cost more than $8,000,000, and the heavy expenditures made this year for road construction, improvement and maintenance.

Hoover Dam Notes

Rough excavation has begun for the stoney gate structures at the outlet ends of the inner diversion tunnels. Geological studies are also being made at the site of the intake towers. During the week ended Oct. 17 stripping above the tunnel inlets on the Arizona side was continued. Excavation of the large heading at the lower portal of the outer Arizona tunnel was stopped Oct. 17 when an accident emphasized the need of suspending that work until a more satisfactory method could be devised for handling loose material. On that date a fall of rock from the face of the 38-ft. heading resulted in the death of three workmen.

Enlarging of the pioneer tunnels to full size was begun at the outlet portals of both inner diversion tunnels. A total progress of 941 ft. was made in driving pioneer headings during the week.

The labor turnover is averaging 100 men per week. All hiring of men is being done through the federal-state employment agency at Las Vegas. An average of 1,000 automobiles are visiting the Hoover Dam observation point weekly.

The memorandum report on structural design studies and model tests of Hoover Dam spillways was completed and copies are being forwarded to each member of the Colorado River Board, which will meet at Boulder City Oct. 30.

Saskatchewan Planning to Combat Drought

A determined effort to combat drought conditions in southern Saskatchewan is being made by the provincial government, a commission, headed by J. F. Bryant, minister of public works, having under consideration 234 suggested sites suitable for the erection of dams for the conservation of water in the areas affected. The commission has already classified all sites under three heads, taking into consideration effectiveness, urgency and cost of construction.

Unemployed to Get $600,000 Road Work in New Hampshire

Gov. Winant, of New Hampshire, has announced that the state will allot $600,000 soon to be expended on state highway work for the unemployed this fall and winter. About $400,000 will represent unexpended balances on highway maintenance work previously planned and $200,000 will be taken from the department surplus built up by savings on large projects last summer.

State Highway Commissioner E. E. Everett plans to scatter this road work for the jobless through all sections of New Hampshire as much as possible, giving preference to those places in which the unemployment problem seems most severe.

Salt Lake City Acts to Employ Local Labor and Materials

To insure the employment of a maximum number of local workers and the use of local materials, Salt Lake City officials are including restrictions in contracts they are now awarding.

The city commission has awarded a contract for installing the Parley's canyon conduit to Frank Parrott, of Texas, on his low bid of $92,824. Restrictions in the contract, to which Mr. Parrott has agreed, are as follows: (1) Labor must be rotated weekly, paid a minimum wage of $3.50 for eight hours' work and handled through the organized employment relief committee's bureau. (2) Not more than four key men can be brought by the contractor from outside the state. (3) All materials used must be made in Salt Lake City or in Utah, and if not manufactured there, must be purchased through Salt Lake City or Utah agencies.

The commission has also instructed City Engineer Jessen to revise his cost estimates on a proposed storm sewer project, estimated to cost $485,000, to be financed through an emergency municipal employment bond issue. The commission has instructed the city engineer to specify that all backfilling and as much pipe laying and digging as possible be done by hand.

A contract to build the Twenty-seventh South equalizing reservoir in Salt Lake City's new water-expansion program has been awarded to H. E. Schraven, lowest of thirteen bidders, at $52,226.48. The contract contains provisions for weekly rotation of labor to provide as much unemployment relief as possible.

Consulting Engineers Protest Free Service by Manufacturers

The American Institute of Consulting Engineers, at the October meeting of its council, accepted a report of its committee on professional practice and ethics protesting against the furnishing of engineering plans and specifications by manufacturers and distributors of equipment and materials. The report of the committee is, in part, as follows:

"The field of the professional engineer, engaged in private practice, is constantly being invaded by manufacturing concerns, both large and small, through the medium of offering to the prospective purchaser of their products of manufacture free consulting engineering service. It is clearly evident that such offering is made for the single purpose of selling their particular articles of manufacture, thus restricting the purchaser to products which may or may not be standard and of the best quality. It is equally evident that such practice not only is vicious, from the standpoint of the engineer engaged in private practice, but deprives the purchaser of the judgment of an impartial expert whose only interest is the interest of his client."

Imperial Dam Contract Meets Opposition

(Continued from page 705)

economically impossible to continue operations in the valley and, in that event, the water rights will be the only asset left.

In response to an inquiry by Secretary Wilbur, Mr. Dowd, Imperial District engineer, expressed the belief that the lower end of the Palo Verde Valley was rapidly becoming alkaline, but C. P. Mahoney, Palo Verde engineer, insisted that not more than 10 per cent of the land had been thus affected and that this was being reclaimed.

The Coachella Valley Land Owners' Association advocated uniting Imperial and Coachella in one district and asked for more time for a new economic and soil survey. The Water Rights Protective Association advocated a clause giving preference to local labor, asked reservation of right to sell water to Mexico, and an exclusive right to sell power.

The Yuma Water Users' Association and the First Yuma Mesa Unit Holders' Association urged that the United States rather than the district should operate and maintain diversion works. They also claimed that Yuma should share in power profits of water carried for Mexico. The city and county of San Diego informed Secretary Wilbur that they have no objections and Representative Swing, by telegraph, urged prompt closing of the contract.

Features of the Contract

The principal features of the contract were outlined by Secretary Wilbur at the hearing as follows:

Works to Be Constructed by United States—For construction of Imperial Dam (upper site) and All-American Canal, with capacities as follows: 15,000 sec.-ft. from diversion dam to Siphon Drop; 13,000 sec.-ft. from Siphon Drop to Pilot Knob; 10,000 sec.-ft. from Pilot Knob westerly near point where Coachella branch diverts. Capacities from this point to termini not stated, being subject to future determination. At Siphon Drop 2,000 sec.-ft. will be diverted for the Yuma project.

Cost of Construction and Terms of Repayment—Contract calls for a maximum expenditure of $38,500,000, but the present estimate of cost is some $34,000,000. The indebtedness assumed is a general obligation of the district to be repaid in 40 annual installments, commencing upon completion of works. The first five installments shall be 1 per cent; the next ten 2; and the remaining 25 3 per cent of the total.

Power Possibilities—Power possibilities on the canal down to and including Siphon Drop are reserved to the United States. District and other cooperating agencies shall have the privilege of developing power at Pilot Knob and elsewhere on the canal at their own expense and shall be entitled to the net revenues received to be paid into the Colorado River dam fund and credited to the district and other agencies in proportion to their respective rights.

Of the power to be developed at or near Pilot Knob there shall be furnished an amount that may be required for use on the Yuma project not to exceed 4,000 hp. Such power shall be furnished at cost plus 10 per cent. This shall not be required until all power developed or capable of being developed at Siphon Drop or elsewhere for the benefit of the Yuma project has been used for project purposes.

Constructed Works to Be Transferred for Operation and Maintenance—Upon completion of works constructed by the United States they shall be turned over to the district for operation and maintenance.

Water for Yuma Project—Not to exceed 2,000 sec.-ft. of water shall be delivered for Yuma project (not exceeding in area 120,000 acres) and for power development at Siphon Drop. Division of water to be made as directed by secretary. If not so made works may be taken over by United States.

Delivery of Water by the United States at the Heading—Water from Hoover Reservoir shall be delivered annually in the Colorado River immediately above Imperial Dam in accordance with allocation recommended by the chief of division of water resources, State of California, subject to availability thereof for use in California under Colorado River compact and Boulder Canyon project act. No water to be diverted or carried for any agency other than district except by written consent of secretary.

Western Society Lectures on Industrial Plant Design

A series of lectures and discussions on the various factors involved in the design of industrial or manufacturing plants has been arranged by the Western Society of Engineers for the special benefit of its "junior section." The lectures will take the form of conferences between the owners and engineers of an imaginary aircraft factory. Subjects include: (1) plant needs and processes; (2) location and site; (3) plant layout; (4) manufacture, storage and shipping; (5) financing; (6) excavation and foundations; (7) structural features; (8) heating and ventilating; (9) power and lighting; (10) water supply and sanitation; (11) personnel and comfort of employees.

China Has Good Roads Conference

The first national good roads conference ever held in China was in session at Shanghai during the last week of September. Sixty delegates were present, representing 26 provinces. Resolutions were passed favoring the establishment of laboratories and experimental stations for roadbuilding materials, for the calling of an annual conference, for setting up uniform specifications for highway construction and for traffic regulation.

Collision With Endpost Wrecks Iowa Bridge

Complete wreckage of a light through-truss span of a bridge over the Iowa River about 2 miles north of Iowa City, Iowa, occurred about a month ago when a truck hauling two trailers collided with the endpost of the span. As it was leaving the bridge, the truck turned out to avoid an approaching car and in doing so the front corner of the first trailer caught under the endpost. According to Stuart Meyers, research assistant in hydraulics, State University of Iowa, this blow knocked the endpost far enough out of the way to allow the truck to move ahead, but the second and last trailer struck the post and remained tangled with it, as shown in the illustration.

The destruction of the endpost caused the span to collapse, the river end being pulled from the piers but the shore end being held in position by the truck train, whose air brakes probably would not permit it to slide backward.

The bridge was 16 ft. wide between railings and was regarded as too narrow for the main highway that it served. It is reported that the state highway department is now pushing preparations for the construction of a new bridge. In the meantime a temporary pile trestle is being constructed to carry traffic until a new bridge can be completed.

Iowa River bridge wrecked by a truck and trailer

WASHINGTON NOTES

By PAUL WOOTON

Washington Correspondent

Proposed I. C. C. Railroad Rate Increases Would Add $16,000,000 to Charge on Building Material

CONSTRUCTION materials would pay about $16,000,000 if the specific rate increases proposed by the Interstate Commerce Commission become effective. This estimate is based upon tonnage shipped in the year ended June 30 last and includes only those materials listed in the commission's report for specific rate increases as follows:

Three dollars per car: gravel and sand, $3,686,000; broken, ground, and crushed stone, $1,643,000; lumber, shingles, and lath, $2,289,000; posts, poles, and piling, $340,000; furnace slag, $360,000.

Six dollars per car: rough stone, $633,000; finished stone, $123,000; artificial stone, $92,000; asphalt, $474,000.

One cent per 100 lb.; cement, $4,331,000; common brick, $679,000; other brick and building tile, $1,283,000.

All other construction materials would bear, in common with all other carload freight except farm products, an increase of 2c. per 100 lb. This would include items not embraced in the $16,000,000 estimate, such as structural steel, nails and wire, plaster, pipe, millwork, wallboard and roofing materials.

The increases apply to all carload shipments regardless of length of haul, and less-than-carload shipments over more than 175 miles. Through shipments will take only one increase.

Loans Only Postpone Day of Reckoning

The Interstate Commerce Commission proposes to put the income from these increased rates into a pool to be used for the aid of railroads in need of help.

The stronger roads that would contribute the bulk of funds to the pool have little reason to hope that the commission will permit them to regard as a repayable obligation the moneys advanced to weak roads. Presumably the beneficiaries will be called upon to substantiate in every detail their eligibility for relief, but as one member of the commission remarked when the reaction among railroad men to the commission's plan became apparent, loans would only postpone the day of reckoning.

The commission's plan is earnings-recapture of a very practical sort, and although the emphasis is upon the immediate emergency, it may point the way to new law in which the strong roads will be pledged to help the weak in the interest of a well-balanced national transportation system. To some railroad men that smacks of government ownership, but the immediate result that the I.C.C. is aiming toward will be to put the spur to railroads' consolidation plans. The commission itself is partly to blame for the slow progress made in that direction during the past ten years, but it has now given to the strong roads an added self-interest to incorporate in their systems weak lines that ordinarily they would attempt to exclude from their consolidations.

That the I.C.C. is fully determined that the proceeds of the increase in rates shall go wholly to roads actually headed toward bankruptcy is demonstrated by the commission's action in offering to cooperate in building up the revenues of roads not in immediate peril. The commission is serious in urging that traffic departments undertake a searching, continuing analysis of their tariff structure to determine what rates may produce more revenue if increased or reduced. In passing upon such proposed rate adjustments the commission pledges itself not only to consider the narrow evidence in each case but to draw upon its own knowledge of the general situation. This process is slow, but the commission promises that it will try to keep pace with the railroads' program by expediting disposition of all cases in which protests by shippers force a hearing.

Bonnet Carre Spillway Crossing Again Referred to Courts

Convinced that he is wasting time in attempting to reach an agreement with the railroads in connection with the problems of their crossing the Bonnet Carré spillway, just above New Orleans, Major Gen. Lytle Brown, Chief of Engineers, has referred the matter again to the judge of the district court.

Gen. Brown proposed that the government construct the bridge over the spillway and do the necessary work of protecting the tracks which would be left on the floor of the spillway. The government was willing to assume all risk of damage to the work when it becomes necessary to use the spillway. Gen. Brown feels that the railroads are insisting upon structures that would eliminate all possible risk, and he takes the position that this is not economical. He thinks structures that would be much less expensive will meet all requirements of the situation but if actual trial should demonstrate that they should be improved in certain particulars the government would be willing to commit itself to do the work.

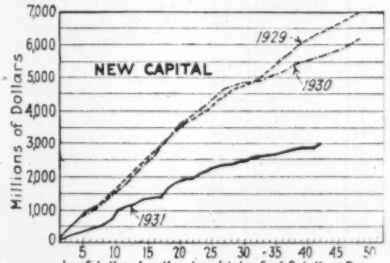
Gen. Brown does not feel that the delay occasioned by these negotiations is serious. Even had the railroads accepted his proposal, he points out that it would have been necessary for the court to confirm the friendly agreement he hoped could be negotiated.

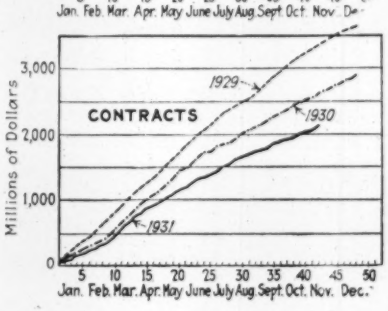
Efforts to settle the matter out of court were made several months ago in the hope that this would expedite construction so as to minimize the damage and to prevent the delays of detouring trains if it should be necessary to use the spillway next spring. Prospects of having to use the spillway in 1932 are now much less. The state of the groundwater and the unprecedentedly low stage of the Mississippi River and its tributaries give rise to the belief that there will be no occasion to use the spillway next spring. At the Weather Bureau the opinion was expressed that if the rainfall this winter and next spring is as great as that in the six months preceding the 1927 flood, the levee system of the lower Mississippi would not be greatly taxed, as a large proportion of the rainfall would be required to bring back the groundwater to normal levels.

Capital and Contracts

A single issue (New York City $20,000,000 4¼s) was floated in the week ended Oct. 24. This issue marks the first financing related to construction that has appeared since the week ended Oct. 3, at which time $20,000,000 private and $3,000,000 public bonds were launched.

In September the weekly average of bond sales was $81,500,000 and in October, 1930, $78,000,000. Cumulatively, financing in the period Jan. 1 to Oct. 24, inclusive, totaled $3,089,000,000, compared with $5,512,000,000 in the corresponding part of 1930.





COSTS AND CONTRACTS

ENR Index Numbers

	Cost		Volume	
Oct. 1, 1931	169.78	Sept., 1931	225
Sept. 1, 1931	171.40	August, 1931	187
Oct. 1, 1930	198.72	Sept., 1930	232
Average, 1930	202.85	Average, 1930	260
Average, 1929	207.02	Average, 1929	317
1913	100.00	1913	100

This Week's Contracts

Heavy construction contracts, reported by *Engineering News-Record* in the week of Oct. 29, with some comparisons, total as follows:

(In Thousands of Dollars)

	Oct. 29, 1931	Average of Last Four Weeks 1931	Average of Last Four Weeks 1930
Buildings:			
Industrial	$1,505	$2,405	$4,269
Other	12,673	23,908	23,044
Streets and roads.	3,723	5,550	8,071
Other construction.	12,854	9,851	11,243
Total	$30,755	$41,714	$46,627

Total, all classes, Jan. 1 to Oct. 29:

1931	$2,186,747
1930	2,811,110

Personal Notes

T. R. LAWSON, head of the department of civil engineering, Rensselaer Polytechnic Institute, has been elected vice-president of the American Society for Testing Materials to fill the vacancy caused by the death of S. T. Wagner.

PERRY M. TEEPLE, formerly hydraulic engineer in the U. S. Engineer department, Montgomery district, Alabama, but more recently associate engineer on the site examination and foundation tests for the new municipal center, Washington, D. C., has been assigned by the war department to projects of flood control and navigation in the Lake Okeechobee and Caloosahatchee River drainage areas, Florida. Mr. Teeple's headquarters are in Jacksonville.

W. H. KIRKBRIDE has been appointed chief engineer of the Northwestern Pacific Railroad Co., with headquarters in San Francisco. He succeeds J. L. Campbell, retired. This new appointment for Mr. Kirkbride is in addition to his present duties as engineer of maintenance-of-way and structures, Southern Pacific Co., Pacific Lines.

OFFICERS to fill the vacancies in James J. Coughlan & Sons, Inc., contractors, of Boston, created by the death of James J. Coughlan, have been named by the board of directors as follows: president, Harry J. Coughlan; treasurer, Arthur C. Coughlan; assistant treasurer and clerk, Gerard T. Coughlan; vice-president, James W. Coughlan.

JOHN W. HOWE, of Los Angeles, has been appointed secretary of the California state highway commission. He will assume his duties immediately.

Obituary

HOWARD ADAMS CARSON, prominently identified with the engineering development of Boston and vicinity, died on Oct. 26 at his home in Malden, Mass., aged nearly 89 years. Mr. Carson was graduated from Massachusetts Institute of Technology in 1869 and in 1871 was appointed assistant engineer on the construction of the Providence waterworks. In 1873 he was placed in charge of the construction of the Providence sewers. From 1878 to 1885 he was principal superintendent of construction of the Boston system of intercepting sewers and main drainage. Later, in 1887-89, he was engaged under F. P. Stearns, chief engineer of the Massachusetts state board of health, on investigations for the disposal of the sewage of the Boston metropolitan district and in 1889 he became chief engineer of the Metropolitan Sewage Commission of Massachusetts, constructing a system of intercepting and outfall sewers for Boston and some twenty other cities and towns. In 1894 Mr. Carson was appointed chief engineer of the Boston Transit Commission and had charge of the design and construction of the original Boston subway, which was opened to traffic in September, 1897. He also had charge of designing and constructing the East Boston tunnel and the Washington St. subway. He resigned in 1909. Mr. Carson had been consulted concerning engineering works in various parts of the country, including the New York and Philadelphia subways. He was one of a board of three that designed and built the double-track tunnel under the Detroit River for the New York Central Lines. In 1921 he was made an honorary member of the American Society of Civil Engineers.

JOSEPH WILLIAM PYKE, who did a great part of the work of diking and reclamation in the flat lands bordering the Fraser River, British Columbia, died recently in Vancouver at the age of 71.

HENRY BICKEL, of Louisville, Ky., president of the Henry Bickel Co. and chairman of the board of the American Builders Supply Co., died of a heart attack on Oct. 19. He was 66 years old. Mr. Bickel had done much excavating and heavy foundation work in Louisville, including widening the Louisville and Portland canal, foundations and excavations for the new federal building and the installation of approaches for the municipal bridge.

ELMER B. LAWSON, of Minneapolis, Minn., died on Oct. 8 at the age of 27. Mr. Lawson was graduated from Massachusetts Institute of Technology in 1927 and had been assistant engineer associated with the Randolph-Perkins Co. in Chicago and assistant engineer in the employ of Theodore Brent, New Orleans.

W. A. BALCOM, a civil engineer who retired about a year ago from the Denver & Rio Grande Western R.R. after a service of 43 years, died in Denver Oct. 15 at the age of 71.

ROBERT MORRIS DRAKE, of San Francisco, retired civil engineer, died on Oct. 25. Mr. Drake was graduated from Leland Stanford University in 1894. He entered the service of the Southern Pacific Railroad, of which he became division engineer in 1904 and district engineer of maintenance-of-way four years later. He retired in 1918.

JAMES STEWART LAIRD, of Essex, Ontario, was killed in an automobile accident on Oct. 22. Mr. Laird, who was 41 years old, was a graduate of Queen's University, Kingston, Ont., and was civil engineer for the townships of Sandwich South, Colchester North, Gosfield South and Essex Town.

SOCIETY CALENDAR

AMERICAN INSTITUTE OF STEEL CONSTRUCTION, New York City; annual meeting, White Sulphur Springs, W. Va., Oct. 28-30.

AMERICAN ROAD BUILDERS' ASSOCIATION, Washington, D. C.; annual convention and road show, Detroit, Mich., Jan. 9-15.

AMERICAN SOCIETY OF CIVIL ENGINEERS, New York City; annual meeting Jan. 19-22, New York City.

ASSOCIATION OF WESTERN STATE ENGINEERS, fourth annual conference, Sacramento, Calif., Oct. 28-30.

AMERICAN ASSOCIATION FOR HYGIENE AND BATHS will hold its 1931 convention in Detroit Nov. 6-7 under the auspices of the Detroit department of health, with the cooperation of the Michigan state department of health. Swimming pool construction and operation, pool sanitation and public baths will occupy the attention of the meeting.

ENGINEERING SOCIETY of Buffalo, N. Y., at its meeting on Oct. 16, was addressed by William P. Creager, who told about his experiences in Russia while acting as an adviser on engineering works of the government.

HIGHWAY RESEARCH BOARD, National Research Council, will hold its eleventh annual meeting in Washington Dec. 10-11. The sessions will be devoted to discussion of reports of research activities in relation to highway finance, transportation, design, materials and construction, maintenance and traffic.

NATIONAL PAVING BRICK ASSOCIATION will hold its 26th annual meeting in Chicago Feb. 10-12.

NATIONAL RIVERS AND HARBORS CONGRESS will hold its 27th convention in Washington Dec. 8-9, at which is expected a large attendance of governors of states, mayors of cities, executive heads of towns and villages and presidents of agricultural, commercial, industrial and waterway associations. Among the matters to come up are whether the body should advocate the passage of a rivers and harbors bill at the coming session of Congress and whether it should advocate a $500,000,000 bond issue to insure the early completion of all adopted waterways projects.

NEW YORK METROPOLITAN DISTRICT meeting, American Society for Testing Materials, will be held in the Hotel Paramount, New York City, on Nov. 5. The subject to be taken up will be nonmetallic protective coatings, and the speakers will be Maximilion Toch, president, Toch Brothers, Inc., "The History of Protective Coatings"; Henry A. Gardner, director, scientific section, educational bureau, American Paint & Varnish Manufacturers Association, "The Economics of Paint"; James K. Hunt, experimental station, E. I. du Pont de Nemours & Co., "The Failure of Non-Metallic Coatings."

NORTH CAROLINA SAFETY CONFERENCE will be held in Charlotte on Nov. 5-6. Representatives of insurance companies writing workmen's compensation insurance will also meet in the same city on the day preceding the opening of the safety conference. More than 800 representatives of industrial plants attended the first safety conference held last year.

SAN FRANCISCO SECTION, American Society of Civil Engineers, held its regular bimonthly meeting Oct. 20, at which S. D. Bechtel, director of Six Companies, Inc., spoke on "Construction Methods on Hoover Dam."

TACOMA SECTION, American Society of Civil Engineers, held its regular monthly meeting Oct. 13 in Olympia, Wash., and listened to papers by C. J. Bartholet, state hydraulic engineer, on the activities of his department, and by C. T. Pollack, state supervisor, fisheries department, on the development of the fishing industry.

TEXAS PUBLIC HEALTH ASSOCIATION, formerly the Texas Association of Sanitarians, will hold its annual meeting in Houston Nov. 9-13. The program includes two days of laboratory work, one day of round-table discussions of Texas drought relief, malaria control and county health unit work, one evening of consideration of unemployment relief and two days devoted to various public health problems.

WASHINGTON IRRIGATION INSTITUTE will hold its annual convention in Wenatchee, Wash., Nov. 20-21, instead of on Dec. 4-5, as previously announced.

Construction Equipment and Materials

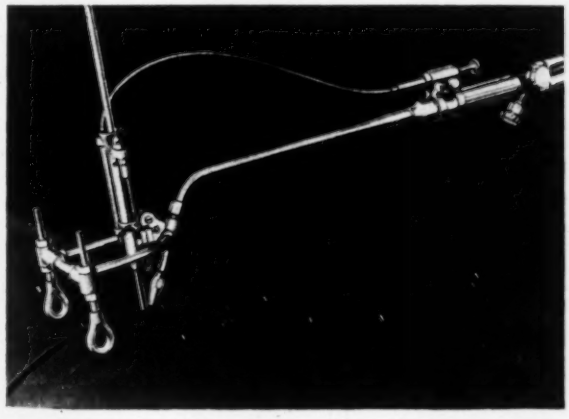
Dual-Flame Welding Torch Mounted on Carriage

Making high-strength welds with a time saving of from 40 to 60 per cent is the function of the type W-21 Lindewelder, a new development of the Linde Air Products Co., 30 East 42d St., New York City, designed for use with the recently announced Lindeweld process (*ENR*, Feb. 12, 1931, p. 297). Features of the new process are a special flame adjustment with an excess of acetylene which fuses the weld metal with the base metal through the medium of a low melting point and high-carbon iron alloys, and the use of a special welding rod with suitable metallurgical characteristics.

The welding technique recommended is what is known as backhand welding, in which the flame is pointed backward against the weld and the flame and rod are manipulated parallel to the line of welding. The flame is alternately laid upon the base metal to prepare it for fusion and on the rod for accelerated deposition of weld metal. Very little melting of the base metal is required and, as a much smaller spacing can be used, a decided economy is effected in the amount of rod, welding gases and time required. In pipe-line welding, the operation is performed at the top of the pipe, which is rotated away from the welder.

The new Lindewelder is a two-flame blowpipe with automatic gravity-feed rodholder. A carriage having two runners supports the apparatus during the welding operation. The two flames and the rodholder are in the same plane, which is also the plane of the pipe joint. The lower, or welding, flame is used for preparing the base metal for proper fusion and for actually melting the end of the welding rod. The upper flame is used for preheating the rod, which is brought to a bright cherry red so that little more heat is required to melt it.

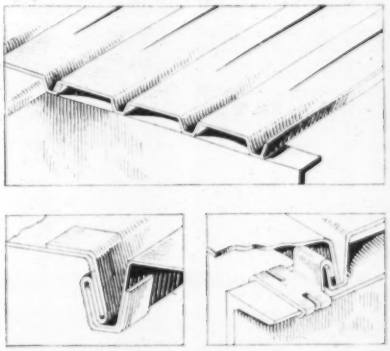
The carriage that supports the blowpipe can be adjusted to maintain the proper position for welding on flat plate or on all sizes of pipe from 4 in. upward. Five sizes of welding heads ranging from No. 9 to 13, inclusive, can be used. Rodholders are furnished for $\frac{3}{32}$-, $\frac{1}{8}$- and $\frac{1}{4}$-in. rods and are furnished with a trigger on the blowpipe handle which permits the operator to raise and lower the rod at will.



Carriage-mounted welding unit uses two flames

Light Steel Roof Deck

Light weight, high strength, ease of erection and low cost are advantages claimed for the U.S.G. steel roof deck, now being offered by the United States Gypsum Co., Chicago, Ill., for use on steel frame structures with flat, pitched, curved or warped roofs. It is particularly adaptable for buildings with large roof spans. Deck plates are rolled from special copper bearing steel in three widths, 6, 12 and 18 in., the latter being standard. Reinforcing ribs 1½ in. deep are rolled into the plates at 6-in. intervals, with intermediate stiffening beads midway between the reinforcing ribs. The plates are designed to interlock, with special clamps for locking them together and to the purlins. The total dead weight of this roof depends upon the amount and type of insulation and roofing materials used, but is approximately 5 lb. per square foot.



Roof deck plates, intermediate and purlin clips

1½-Cu.Yd. Power Excavator

Announcement of a new convertible excavator to be known as Model K-38 with a capacity of 1½ cu.yd., has been made by the Link-Belt Co., West Pershing Road, Chicago, Ill. This is an all-purpose unit, serving as a shovel, crane, trench hoe or dragline, and can be furnished with all usual attachments. The power source may be a gasoline engine of 130 hp. or a diesel engine or electric motor of corresponding capacity. Standard equipment as a shovel includes a 25-ft. boom, 17½-ft. dipper stick and a 1½-cu.yd. dipper. Rigged as a crane, lifting capacities vary from 32 tons at 12-ft. radius to 10,400 lb. at a 45-ft. radius with a 45-ft. boom. Dragline booms are supplied in 45- and 50-ft. lengths for buckets varying from 1½ to 2 cu.yd. The character of the work and the digging depth determine the size of bucket used as a trench hoe; for normal digging depth, in average soils, a 2-cu.yd. solid-bottom bucket is standard.

1½-yd. shovel, showing chain crowd

Spreader for Sand or Gravel

Fine or coarse sand or gravel, dry or as it comes from the bank, can be spread over ice or placed for sand and gravel highways with the Reliance sand and gravel spreader, developed by the Connecticut department of highways and now manufactured by the Universal Road Machinery Co., Kingston, N. Y. The amount of material applied per square yard, the width and depth of spread and the direction of travel are all under the operator's control from a seat located at the head of the machine. Material is placed ahead of both spreader and truck, so that both are always traveling on the covered surface. For sanding, widths up to 30 ft. can be treated; with heavy applications the machine will spread a width of from 8 to 12 ft.

Major units of the machine include a short and a long belt conveyor, a revolving disk and an independent power unit. Three gear ratios are provided so that any desired degree of coverage can be obtained. The machine is not self-propelling, but is designed for attachment to any standard dump truck by

(Continued on p. 714)

Current Construction Unit Prices

72-In. Water Conduits in Brooklyn

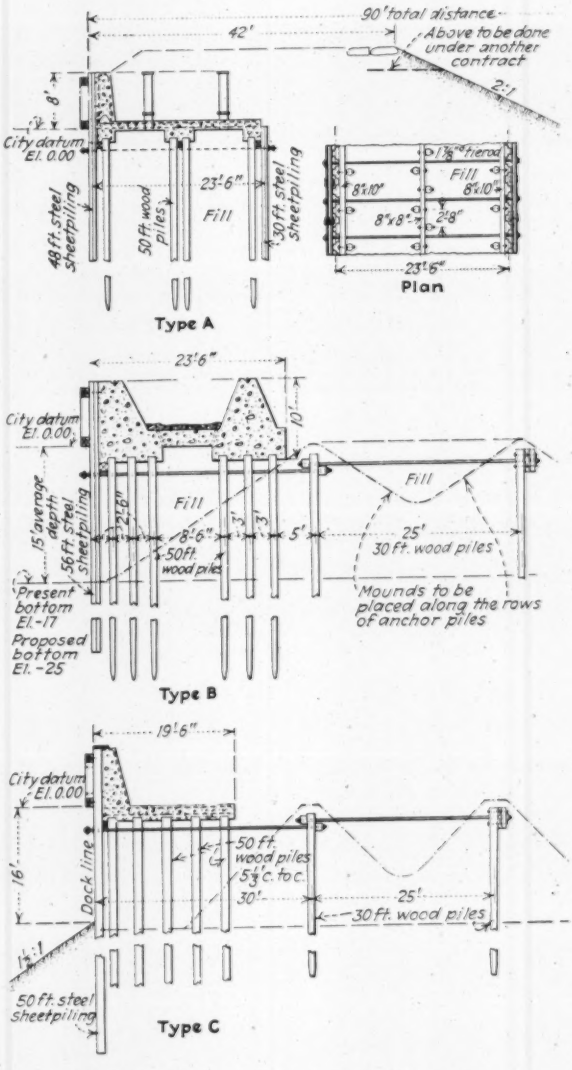
FOUR 72-in. steel water conduits totaling 2,600 ft. in length are being installed in Third Ave., Schermerhorn, Nevins and State Sts., Brooklyn, N. Y. On Nevins St. one conduit is laid directly over another new conduit which will be incased in concrete. Where not incased in concrete, the exterior and interior of the conduits are covered with a protective coating of bitumastic solution of enamel. Depth of trench is about 9 ft. except where the pipe fits into shafts some 18 ft. below steel level. The largest items are: 15,000 cu.yd. earth excavation, $37,500; 2,470 ft. 72-in. steel pipe, $55,575; six Venturi meters, $56,000; these three totaling $159,075, or 69 per cent of the contract price. Thirteen bids were received, and unit prices are given of the lowest three: (A) Bronx Water Works Corp., 1 Riverdale Ave., Bronx, N. Y., $230,865, contract: (B) W. J. Culligan, Bayonne, N. J., (C) Oakhill Contracting Co., Inc., Great Neck, N. Y.

	A	B	C
15,000 cu.yd. earth excav. and refilling	$2.50	$1.80	$2.75
420 cu.yd. rock and masonry excav.	2.00	3.50	6.00
130 M. ft. lumber	40.00	40.00	30.00
130 lin.ft. 48-in. steel pipe	22.50	14.25	24.55
2,470 lin.ft. 72-in. steel pipe	22.50	28.26	24.55
21 tons c.i. valve boxes, manhole heads	40.00	60.00	65.00
36,000 lb. steel castings	.20	.17	.23
60,000 lb. struct. and reinf. steel	.05	.05	.06
28,000 lb. lead pipe and misc. metal	.15	.10	.12
6 Venturi meters	11,000.00	9,660.00	9,500.00
2,450 bbl. cement	2.00	2.30	3.00
1,300 cu.yd. concrete and brick masonry	10.00	15.00	17.00
300 cu.yd. conc. masonry under pavements	7.00	7.00	6.00
50 water services, 2-in., replaced	10.00	6.50	10.00
2,400 lin.ft. vit. 6- to 15-in. pipe	1.00	.85	3.00
1,800 sq.yd. temporary bit. macadam	1.00	.90	1.75
1,700 sq.yd. temporary cinder pavement	.50	.20	.35
700 sq.yd. permanent pavement	3.00	2.00	1.75
1,300 sq.yd. concrete sidewalks	1.00	2.50	2.70
1,300 lin.ft. curb	.50	1.00	1.00
	$230,865.00	$242,084.70	$249,870.60

Dockwork for Sewage-Disposal Plant at Milwaukee

DOCKS, a temporary effluent channel, cutoff walls and excavation for a sewage-disposal plant extension on Jones Island are being constructed for the Sewerage Commission of Milwaukee, Wis. Contract was let in August, 1931, for $555,728. The dockwork totals $400,000, or 73 per cent of the contract price. There are three types, as shown in the drawing.

Type A dock is 989½ ft. long by 23½ ft. wide, built of two rows of steel sheetpiling with wooden supporting piles and a reinforced-concrete superstructure. Sand fill is placed between the rows of piling. Cutoff walls are spaced 53 ft.



Sections through Types A, B and C docks

The linear foot price includes cost of an effluent outfall, the fill, and protection at the junction of docks A and B.

Type B dock has a single row of steel sheetpiling with wood supporting piles and anchor piles and a concrete superstructure. The steel piling extends to the top of the concrete, which supports a gantry crane. Cost includes sand fill around the anchor piles. Type C is of the same general description but without a gantry.

The cutoff wall is of two sections: A, 680 ft. of 40-ft. steel sheetpiles; B, 850 ft. 25-ft. sheetpiles. The effluent channel is constructed of two rows of steel sheetpiles spaced 20 ft.

Five bids were received; unit prices are given of the lowest three: (A) E. E. Gillen Co., Milwaukee, contract; (B) Merritt, Chapman & Whitney, Duluth; (C) Stein Construction Co.,

Paving Prices in Santa Clara, Calif.

Type of Pavement	Location or Street	Square Feet 5 In.	Square Feet 6 In.	Bid Per Sq. Ft. 5 In.	Bid Per Sq. Ft. 6 In.	Contract Price	Awarded	Bidders
Conc.	Main and Bank	19,215	43,500	15.5	17.5	$11,135	Apr. 22, '29	9
Conc.	Franklin and Sherman	42,400	67,900	15.6	17.5	21,562	Apr. 22, '29	9
Conc.	Lincoln St.		78,840		20.			8
Bit.	Lincoln St.	31,260		18.		29,300	Apr. 22, '29	8
Conc.	Main and Monroe	298,000	31,840	16.4	18.	57,541	July 16, '29	8
Bit.	Washington and Jackson			20.1	22.2			5
Conc.	Washington and Jackson	282,200	46,000	16.75	18.0	58,477	Aug. 20, '29	7
Bit.	Lafayette St.		170,200		15.5	28,785	Dec. 18, '29	6
Bit.	Madison and Jefferson	491,300	85,900	13.75	15.75	93,675	Dec. 18, '29	6
Conc.	Benton, Liberty, etc.	390,000	283,500	16.25	18.7	130,545		12
Bit.	Benton, Liberty, etc.	390,000	283,500	13.3	16.0	110,363	Feb. 3, '30	3
Bit.	Union Ave.		128,000		16.0			2
Conc.	Union Ave.		6,000		19.4	31,310	June 23, '30	2
Bit.	Santa Clara-Market	491,000		12.1		68,407	Feb. 2, '31	6
Conc.	Santa Clara-Market	5,400		19.6				6
Bit.	Lewis-Harrison	516,000	19,000	12.1	13.77	80,087	Feb. 2, '31	4
Bit.	Bellomy and Campbell Ave.		76,000		12.75	10,997	Feb. 16, '31	5
Bit.	Lexington and Main	64,000	126,000	12.1	13.77	29,956	Feb. 2, '31	5

Note—Above prices include grading and 3 in. of quarry waste.

Milwaukee. James L. Ferebee is chief engineer of the Sewerage Commission.

	A	B	C
980.5 lin.ft. dock, type A	$146.43	$199.00	$188.00
1,100 lin.ft. dock, type B	162.24	202.50	209.00
295 lin.ft. dock, type C	122.40	143.00	197.00
132,000 cu.yd. sand fill	.42	.45	.70
218,000 cu.yd. fill dredged and taken from piles on site	.22	335	.22
680 lin.ft. cutoff wall sec. A	37.93	41.00	53.00
850 lin.ft. cutoff wall sec. B	20.56	25.00	31.00
Temporary effluent channel, complete	35,800.00	52,200.00	53,000.00
3,500 tons protection stone	3.57	3.50	3.50

New Orleans Paving Prices for 1922-1931

UNIT paving prices bid in the years 1922-31, inclusive, have been compiled by Pat Quinlan, city engineer of New Orleans, La. The principal items are given herewith. The least fluctuation has been in excavation, which cost $0.72 in 1922, a maximum of $0.98 in 1926, a minimum of $0.47 in 1930, and $0.70 in the second letting of 1931 on Sept. 10-11. Drain pipe, 6 to 24 in., is now at the lowest point in the last ten years. The same is true for catchbasins, standard manholes and stone curbing. Wood curbing, stone headers and oil asphalt paving are lowest since 1925. Uvalde rock, 2 in. thick, was bid at $1.48 in the second letting this year and $1.66 in the first letting, compared with $1.65 and $1.68 in 1930 and $1.55 in 1929. Bituminous concrete, 2 in., was bid at $1.09 in the second letting this year, compared with a minimum of $1.03 in the first letting of 1928. Vitrified brick, 2½ in., was bid at $1.83 in the second letting and $2.12 in the first letting, compared with $1.50 and $2.10 in 1930.

PAVING UNIT PRICES IN NEW ORLEANS, 1922-1931

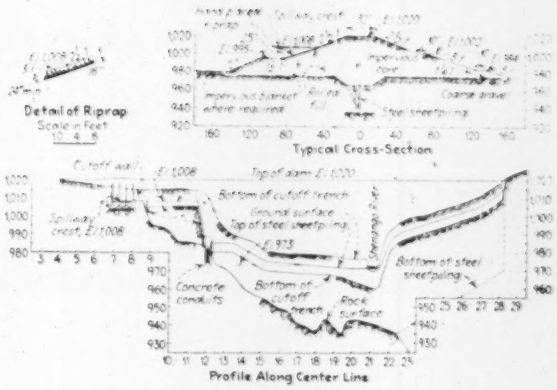
First or Second Letting	Excav., Cu.Yd.	12-In. Drain Pipe, Lin.Ft.	18-In. Stone Curb, Lin.Ft.	Circ. Stone Curb, Lin.Ft.	Wood Curb, M.Ft. B.M.	Stone Headers, Lin.Ft.	Conc. for 6-In. Foundation, Sq.Yd.	Oil Asphalt, 1½-In. Binder, 1-In. Surface, Sq.Yd.	Bit. Conc. 2-In., Sq.Yd.
1st, 1922	$0.72	$0.64	$1.73	$3.19	$62.06	$1.30	$1.79		$1.69
1st, 1923	.79	.75	2.09	3.55	67.94	1.28	1.92	$1.21	1.58
1st, 1924	.82	.77	1.84	3.62	68.50	1.35	1.86	1.30	1.06
1st, 1925	.64	.73	1.84	4.05	68.00	1.24	1.94	1.33	1.31
2d, 1925	.57	.61	1.79	3.33	64.57	1.13	1.83	1.24	1.15
1st, 1926	.84	.63	2.00	3.84	82.82	1.24	2.01	1.38	1.26
2d, 1926	.98	.63	1.91	4.08	84.00	1.23	2.09	1.51	1.32
1st, 1927	.77	.58	1.64	3.48	90.00	1.33	2.08	1.51	1.32
2d, 1927	.93	.53	1.86	3.33	95.64	1.25	1.67	1.24	1.06
1st, 1928	.92	.52	1.45	2.90	95.38	1.16	1.74	1.21	1.07
1st, 1929	.73	.53	1.71	3.14	103.45	1.27	1.97	1.36	1.16
2d, 1929	.58	.50	1.71	3.25	104.00	1.32	1.86	1.36	1.17
1st, 1930	.76	.47	1.78	3.39	105.00	1.32	1.92	1.61	1.41
2d, 1930	.47	.46	1.83	3.35	103.00	1.33	1.92	1.65	1.50
1st, 1931	.60	.45	1.30	1.93	80.00	1.20	1.48	1.55	1.28
2d, 1931	.70	.45	1.13	1.84	75.00	1.18	1.57	1.30	

Pymatuning Earth Dam Near Jamestown, Pa.

PYMATUNING DAM, across the Shenango River valley 1½ miles above Jamestown, Pa., is to be an earth embankment 2,400 ft. long and 50 ft. high. It will contain 370,000 cu.yd. of embankment and involve 180,000 cu.yd. of excavation. Other large items are 5,000 cu.yd. concrete, 900 tons steel sheetpiling, 9,000 cu.yd. riprap and 4,000 cu.yd. stone paving. Contract was awarded in September, 1931, by the state water and power resources board for $339,567.

Concrete is 1:2:4 for the richer mixture and 1:3:6 for the leaner mixture. The specifications state the minimum wages to be paid by the contractor. These are 75c. per hour for operators of such machines as power shovels, cranes and excavators; 60c. for building mechanics; 45c. for operators of power graders, tractors, trucks, compressors, drills, pumps and road-rollers; 40c. for semi-skilled hand laborers; 35c. for common labor.

Thirty bids were received. Unit prices are given of the successful contractor, C. R. Cummins, Inc., Union Trust Building, Cleveland, and the averages of the unit prices of all the bidders.



Cross-section and profile, Pymatuning Dam, Pa.

Item	Cubic Yards Excavation	Contract Price	Average 30 Bids
3.	6,000 soil stripping	$0.75	$0.68
4.	70,000 for conduits, above el. 973	19½	43½
4a.	10,000 below 973	75	86
5.	63,000 for spillway, above 973	19½	34
5a.	3,000 below 973	75	79
6.	18,000 for cut-off trenches, above 973	25	34
6a.	6,000 below 973	1.50	76½
7.	100 for minor drainage	50	1.31
8.	1,000 miscellaneous	35	89
9.	9,000 rock	1.00	2.07
	Cubic Yards Earth Embankment		
10.	135,000 from excav.	19½	19½
11.	225,000 from borrow	24½	43
14.	9,000 miscellaneous	25	40
15.	4,500 surface dressing and grassing	75	1.27
	Cubic Yards Concrete, Placing		
16.	1,800 in conduits and gate tower	9.48	12.21
17.	200 in bridges except piers and abutments	11.00	19.79
18.	1,000 in slope paving and floors	8.40	8.68
19.	2,200 in retaining walls, bridge piers	9.48	10.70
20.	7,500 bbl. cement	1.55	1.87½
21.	90,000 lb. reinf. steel	.03	.04
22.	9,000 cu.yd. riprap	3.45	6.74½
23.	3,000 sq.yd. stone paving in gutters and ditches	3.00	2.21
24.	100 cu.yd. crushed stone or gravel	1.70	3.36½
25.	4,500 cu.yd. dry rubble paving	3.95	8.76
26.	1,700 cu.yd. gravel paving	3.95	4.16
26a.	1,700 cu.yd. concrete paving	9.50	8.71
27.	4,500 ft. post and cable guard rail	.90	.83
27a.	1,000 cu.yd. stone wall guard rail	4.50	9.65½
28.	800 ft. hand rail	2.25	2.11
29.	5 M.ft. bm. timber	80.00	96.68
30.	900 tons steel sheet piling	42.23	47.19
31.	67,000 sq.ft. steel sheet piling, driving	18½	33
32.	30,000 lb. iron and steel	09	09
33.	Cleaning up	1,000.00	2,181.63

Monolithic Concrete Sewer in Portland, Ore.

BALCH GULCH concrete storm sewer in Portland, Ore., was awarded July 29, 1931, to Parker-Schram Co., Couch Bldg., for $102,153; city engineer's estimate $147,619. Contract unit prices are given in the table. Construction is in reclaimed low land, sand-filled from the Willamette River. The system includes 739 ft. of 48-in. monolithic reinforced-concrete sewer pipe, which will parallel a 42-in. concrete pipe already in place. A junction chamber connects these two sewers to an existing 60-in. line. At the intake of this 60-in. sewer a dam and screen will be built to collect and dispose of debris. At the outlet end of the 42-in. and 48-in. sewers, a junction chamber will connect them with a new 66-in. monolithic sewer included in this contract. This sewer will extend 4,710 ft. to the Willamette River. O. Laurgaard is city engineer.

24,815 cu.ft. trench	$1.10
15 cu.yd. Class A concrete 1:2:4	15.00
25 cu.yd. Class B concrete 1:2½:5	14.00
200 lb. reinf. steel	.10
500 cu.yd. crushed stone or gravel	2.50
200 sq.yd. hard pavement taken up and relaid	2.50
4,710 ft. 66-in. mon. sewer, reinf.	12.00
739 ft. 48-in. mon. sewer, reinf.	7.75
52 ft. 42-in. mon. sewer, not reinf.	7.00
1,000 ft. 10-in. drain	0.60
Two junctions	1,150.00
5,500 cu.yd. basin excav.	0.60

New Publications

Pipe Coatings—American Rolling Mill Co., Middletown, Ohio, has issued an 8-p. bulletin dealing with protective coatings for Armco spiral welded pipe.

Pumps—Single-stage, double-suction centrifugal pumps of the horizontally split casing design are described and illustrated in a 12-p. catalog B-2 issued by the De Laval Steam Turbine Co., Trenton, N. J.

Valves—A 172-p. catalog listing 30 types of lubricated plug cock valves has been issued by Merco Nordstrom Valve Co., 343 Sansome St., San Francisco, Calif.

Powder Magazine—A portable steel powder storage magazine now being manufactured by Littleford Bros., Cincinnati, Ohio, is described in a 4-p. leaflet issued by that company.

Motors—Over 700 industrial engine installations using Buffalo power plants are listed in a Blue Book published by the Buffalo Gasoline Motor Co., Buffalo, N. Y.

Trucks — Construction firms, contract haulers and supply men using Autocar trucks are listed in a 50-p. book published by the Autocar Co., Ardmore, Pa., which also contains many illustrations showing these trucks in use on widely known construction jobs.

Marine Equipment—Bulletin 41, prepared by the Lambert-National division of the McKiernan-Terry Corp., 15 Park Row, New York City, gives specifications of cargo, warping and towing winches, marine railway hoists, cranes, capstans, windlasses, and car-float transfer bridges. It contains 32 pages and many illustrations.

Portable Testing Machines—Transverse testing machines for field use in breaking concrete beams 6x6 and 8x8 in. in size are described in a 4-p. leaflet issued by H. C. Berry, University of Pennsylvania, Philadelphia, Pa.

Lights—Portable floodlights, mounting brackets and tripods are described in Bulletin 167 of the Pyle-National Co., 1334 North Kostner Ave., Chicago, Ill.

Gears—The construction of steel gears from welded blanks is described in a recent bulletin by Lukenweld, Inc., Coatesville, Pa.

Car Wheels—Carnegie rim-toughened wrought-steel wheels are discussed in a recent bulletin of the Carnegie Steel Co., Pittsburgh, Pa.

Surveying Instruments—Brandis & Sons, Inc., 754 Lexington Ave., Brooklyn, N. Y., has published a new 54-p. catalog of surveying instruments and field equipment.

Zinc—Two recent publications of the New Jersey Zinc Co., 160 Front St., New York City, deal with the uses of zinc die castings in various industries and the plating of rolled zinc and zinc die castings.

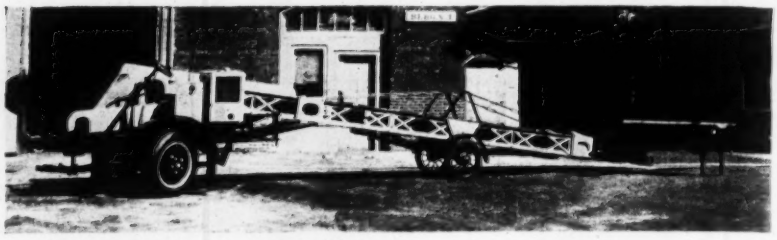
Flexible Couplings—Bulletin 47 of the Morse Chain Co., Ithaca, N. Y., gives full information regarding Morse flexible couplings. It contains 24 pages and many illustrations, charts and tables.

Steel Windows—Fenestra steel windows for hotels and apartments, public and office buildings, colleges and universities and corrective institutions are described in four recent bulletins of the Detroit Pressed Steel Products Co., 2250 Grand Boulevard, Detroit, Mich.

Strain Gages—Electric telemeters of the carbon-resistor type, used for the accurate measurement of strains in structural members, form the subject of Bulletin 27, issued by the Baldwin-Southwark Corp., Philadelphia, Pa. This contained 32 pages, many illustrations and a great deal of detailed information on the uses of this new type of instrument.

Snow Removal—"Keeping Trucks in Condition for Keeping the Highways Open" is the title of a 32-p. booklet issued by the Four Wheel Drive Auto Co., Clintonville, Wis. The first section of the book is devoted to snow-removal methods and equipment, while the second is on the care of snow-removal equipment.

Protective Coatings—Rubase impervious paints for protection against corrosion are described, with particular reference to filtration and sewage treatment plants, in a 4-p. folder prepared by the Rubase Corp., Cleveland, Ohio. The products of the company utilize a base consisting of live rubber in solution, together with suitable varnishes and pigments.



Sand and gravel spreader for highway construction and maintenance

Spreading Machine

(Continued from p. 711)

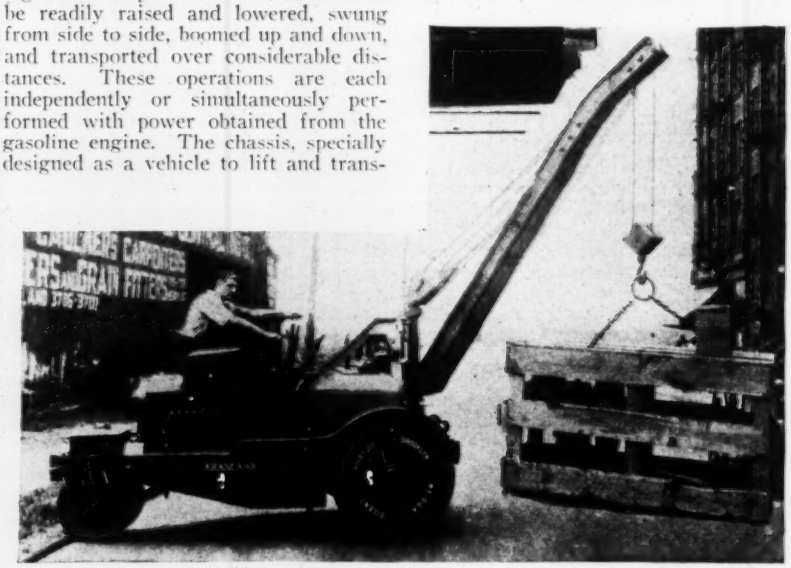
means of a coupling pin. The short conveyor is pivoted at the foot of the long conveyor and can swing out to permit the loaded dump truck to be attached, after which it swings back of and is attached to the rear of the truck chassis. With the body of the truck elevated to dumping position, material is delivered to the short cross-conveyor, passes to the long conveyor and thence to the distributor. The spreader is equipped with anti-friction bearings throughout and when not operating can be hauled from place to place at ordinary truck speed. It will handle up to 60 tons of material per hour, the capacity depending on the type of coverage required. When spreading heavy cover, the operating speed is 5 or 6 m.p.h.; when sanding, 10 to 15 m.p.h.

Small Crane for Industrial Use

A locomotive-type crane of moderate capacity, driven by a gasoline motor, has been designed by the Silent Hoist Winch & Crane Co., 762 Henry St., Brooklyn, N. Y., for use in and about industrial works, railroad shops, storage yards, by highway and subway contractors, public utility operatiors and municipal departments. It is so designed as to permit full rated loads to be readily raised and lowered, swung from side to side, boomed up and down, and transported over considerable distances. These operations are each independently or simultaneously performed with power obtained from the gasoline engine. The chassis, specially designed as a vehicle to lift and transport weights, has small over-all dimensions, and will pass through openings as narrow as 5½ ft. and as low as 7 ft. A short turning radius makes it easy to maneuver. Rated capacity of the crane varies from 5,000 lb. at a 5-ft. radius to 2,500 lb. at 10-ft. radius, through an arc of 180 deg.; loads exceeding these figures by 80 per cent can be lifted with the boom in fixed position directly to the front.

The traction wheels are in front, where they also support the load. Steering is through the rear or trailing wheels, this arrangement permitting easy steering when the crane is loaded. Stabilizers, outriggers, jacks or similar devices are not required to maintain the stability of the car.

Power for operating the crane mechanism is obtained from the engine by a roller chain drive from a two-speed power take-off attached to the transmission. Separate winches are used for load and boom lines, and also for the swinging mechanism. All of these are worm gears, with a positive clutch-reversing mechanism built into the gear case and running in a bath of oil. As the worm gears are self-locking, power is applied to lower the load as well as to raise it, and when the power is off, the load and boom are securely held in position. Absolute safety of operation is insured by an additional auxiliary shoe brake which is automatically applied when the power is off.



Gasoline-powered industrial crane

CONSTRUCTION NEWS

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Some of the Week's Large Projects

For further details turn to appropriate sections in this issue

Location	*Project*	*Cost*	*Status*
Waterworks			
San Jose (Cal.)	Dams, pumping plants, etc.	$6,000,000	Bond election
New Orleans	Waterworks, sewerage and drainage	1,000,000	Bids asked
Sewers			
Chicago	Sewer	2,500,000	Bids asked
Chicago	Sewer	1,620,510	Contract
Columbus (O.)	Sewage disposal plant	4,000,000	Proposed
Bridges			
Cleveland	Bridges	6,000,000	Proposed
Railways			
California	Station, track changes, etc.	10,000,000	Proposed
Texas	Railway extension	3,000,000	Owners forces
Texas	Railroad	1,000,000	Proposed
Grade Crossings			
Buffalo	Grade elimination	1,500,000	Bids asked
Grain Elevators			
Albany	Grain elevator and warehouse	1,497,235	Contract
Unclassified			
Montana, Oregon	Gas pipe line	10,000,000	Proposed
Quincy (Mass.)	Oil terminal	2,000,000	Proposed
Federal Government			
Davenport (Iowa)	Dam, etc.	3,000,000	Bids asked
Buildings			
Berkeley (Cal.)	University building	1,000,000	Bids asked
Cambridge (Mass.)	Technical school	1,500,000	Bids asked
St. Paul	Office	1,000,000	Bids asked
Portland (Ore.)	Market	1,250,000	Proposed
Pittsburgh	Hospital	2,000,000	Proposed
Montreal	Hospital	1,500,000	Contract

WATERWORKS

PROPOSED WORK

Ariz., Mesa—Watermain and sanitary sewer extensions in North Mesa and South Mesa Blvds., Mahoney, West 1st and Dana Aves., North Robinson, Grand, North Center, Pima, Lewis, Pasadena, Sirrine, 4th, West Main, Date and Vineyard Sts. S. M. Morse, Drew Bldg., engr.

Ga., Cornelia—City, c/o L. Y. Irvin, mgr., waterworks, 500,000 g.p.d. capacity, incl. several buildings. Robert & Co., Bona Allen Bldg., Atlanta, engrs.

Mich., Marquette—City increasing pumping to 13¼ m.g.c., incl. 3 electric units, new pipe line from waterworks to 12 in. main on Cedar St., power transmission line from Dead River power plant to waterworks. Two of proposed new pumps to be dual drive type with gasoline standby motors. $40,000. Pearse, Greeley & Hansen, 6 North Michigan Ave., Chicago, Ill., engrs.

N. H. Sunapee—M. G. Chase, heads committee to make surveys water works. To exceed $15,000. Engineer not appointed.

O., Cleveland—Brick, steel, concrete, pumping station and administration building for Parma Reservoir. $300,000. H. Kregelius, City Hall, engr.

Okla., Nichols Hills (Oklahoma City P. O.)—Preliminary plans new deep well water supply. $18,000. Benham Eng. Co., Perrine Bldg., Oklahoma City, engrs.

Pa., Bedford—For 38 m.g. additional reservoir. S. C. Hulse, engr., Bedford, recommends building dam across Pigeon Creek. Election Nov. 3, $100,000 bonds for same.

Pa., Carlisle—Boro, distribution system additions, new pumping equipment, elevated tank. $50,000. Morris Knowles, Inc., Westinghouse Bldg., Pittsburgh, engrs.

Ont., Ingersoll—Watermains in Canterbury, Concession and Frances Sts., concrete paving Wellington and Concession Sts. $28,000. W. R. Smith, town clerk. Engineer not appointed.

Ont., Toronto—York Twp. 6 in. c.i. mains in 2 lanes, Little Blvd. and Valewood Ave. and 12 in. c.i. mains in Industry St. and Trethewey Dr. $39,074. T. S. Scott, 40 Jarvis St., engr.

Ont., Westboro—A. E. Morris, clk. Nepean Twp., soon takes bids new mains in Water Area 1. $26,000.

BIDS ASKED

Calif., Vallejo—See "Contracts Awarded."

Conn., Rocky Hill—Nov. 2, by Rocky Hill Incorporated District, O. E. Holmes, pres., 450,000 gal. steel standpipe 85 ft. high with roof and concrete found.; adv. E. N.-R. Oct. 22.

Ind., Knightstown—Nov. 4, by Bd. Comrs. Indiana Soldiers & Sailors Children's Home, water tanks, mains, pumping equipment. $40,000. J. M. Rotz Co., 704 Merchants' Bank Bldg., Indianapolis, engrs.

La., New Orleans—Dec. 15, by Bd. P. Wks., furnishing labor, material, on percentage basis for waterworks, sewerage and drainage construction for 1932. $1,000,000.

N. Y., New York—Nov. 6, by Dpt. Water Supply, Gas & Electricity, Municipal Bldg., mains, appurtenances, transferring taps on Bway., Madison Ave., East 25th and West 165th Sts.

N. Y., St. George—Nov. 6, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains in City Blvd., Allentown Lane, Woodbridge Pl., Old Amboy Rd., Auburn, Mallory, Stewart and Union Aves., Cornell, Housman, Spruce, Winant, 3rd and 10th Sts.

O., Ashland—Nov. 6, by C. H. Ganyard, mayor, 2 m.g.c. steel storage tank, 92½ ft. in diam., 40 ft. high on concrete found. $26,000. Noted Sept. 3.

Okla., Hobart—City bids about Dec. 1, new water supply. W. R. Holway, 30 East 18th St., Tulsa, engr.

Ont., Caledonia—Nov. 6, by J. Avery, clk., 6 in. c.i. mains, valves, hydrants, house connections, pumps, wells, reservoir for waterworks. To exceed $25,000. Ontario Eng. Co., Riverview Bldg., Fort Erie, engrs.

Ont., Simcoe—See "Contracts Awarded."

CONTRACTS AWARDED

Calif., Vallejo—Will install water treatment plant at Fleming Hill Reservoir, own forces. T. D. Kilkenny, city engr.

Conn., Hartford—Bd. Contr. & Supply, 550 Main St., furnishing c.i. bell and spigot pipe, to R. D. Wood & Co., 400 Chestnut St., Phila., Pa., $4,527; laying pipe in Wethersfield, to Pasquale & DiGregorio & Co., Hartford, $6,565.

Ind., Petersburg—Petersburg Water Co., Diesel engines, to Worthington Pump & Mchy. Corp., 2 Park Ave., New York, $25,363. Noted Sept. 17.

N. Y., Brooklyn—J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains in Avenue H, to Ozone Park Water Co., 96-29 Rockaway Blvd., Ozone Park, $8,680. Noted Oct. 1.

O., Barberton—New standpipe, to Pittsburgh-Des Moines Steel Co., Neville Island, Pittsburgh, Pa., $25,900. Est. $30,000.

Tenn., Nashville—Bd. P. Wks., at office S. H. McKay, city clk., 14 m.g. filtration plant addition, to W. L. Hailey & Co., 314 42nd Ave. N., $119,300. Noted Sept. 22.

Tex., Yoakum—City, c/o E. S. Winfree, mayor, waterworks contract re-assigned to Broussard-Warfield Co., Beaumont, $258,392. Former contract rescinded. Noted Feb. 19, under "Contracts Awarded."

Utah, Salt Lake City—For 5 m.g. equalizing rein.-con. reservoir, to Clyde & Whiting, Springville, $31,473. Est. $37,000. This corrects report in Oct. 22 issue.

Wis., Appleton—Appleton Water Comm., City Hall, 2 additional filters complete in pumping station, improvements in old filters, to Norwood Eng. Co., Florence, Mass. $15,800.

Wis., Milwaukee—Mains in Blue Mound Rd. to C. E. Stormowski, 1874 North Warren Ave., $1,019; West Blue Mound Rd. from 46th to 52nd Sts. and North 10th St. to A. W. Glawe-Wauwatosa, $14,106 and $2,615 respectively. West Blue Mound Rd. from 44th to 45th Sts. to Wenzel & Henoch Co., 1524 North 27th St., $12,235; West Stevenson St., to Werner Co., 721 8th Ave., Wawatosa, $3,919. Grand total $33,894.

Wis., Racine—Water intake tunnel, to G. R. Fehr, 2755 South 34th St., Milwaukee. $26,920.

Ont., Simcoe—Town, 3,400 lin.ft. 6 in. and 2,100 lin.ft. 8 in. c.i. mains, valves, hydrants, day labor. $20,000. G. R. Marston, Simcoe, engr.

SEWERS

PROPOSED WORK

Ariz., Willcox—City Council sewer and water systems. $100,000. A. A. Weil Eng. Co., 1st Natl. Bank Bldg., Pueblo, Colo., engrs.

Conn., Meriden—Fuller-McClintock Co., engrs., 170 Bway., New York, completed surveys sewerage system, for City. $400,000. Noted Mar. 26.

Ill., Galesburg—Bd. Trustees Galesburg Sanitary Dist., rejected bids Sept. 25, completing Cedar Fork Improvement, Contr. D, incl. installing interceptor, bridges, dredging Cedar Fork. Will readvertise. Noted Sept. 3.

Ill., Mendota—City Council 1 story, brick sewage disposal plant, filters, drying beds. $50,000. Eng. Serv. Co., 95 South LaSalle St., Chicago, engrs.

Ill., Waterloo—Sewerage system, sewage disposal plant, from 7 to 8 mi. sewers. $80,000-$100,000. Sheppard, Morgan & Schwaab, Faulstitch Bldg., Alton, engrs.

Ind., Winchester—Sewage disposal plant. $100,000. A. Ross, mayor.

Minn., Duluth—Soon takes bids storm sewers, park improvements, etc. $250,000 voted.

Mo., University City—Preliminary surveys enclosing River Des Peres Sewer Project from city limits north and westward through University City. W. W. Horner, 300 City Hall, St. Louis, consult. engr.

N. J., Bridgeton—Sanitary sewer extension. $110,000.

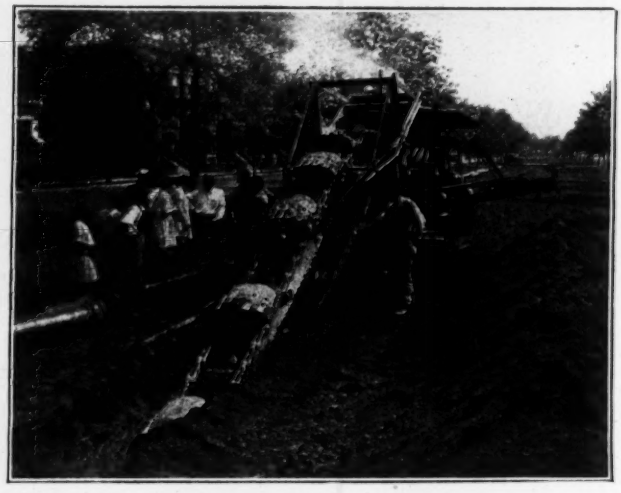
N. J., Fairview—Bd. Boro Council, Tin Hose Fire House, new sewage disposal plant. To exceed $100,000. **Maturity indefinite.** V. Oleri, 650 Bergenline Ave., West New York, engr. Noted Apr. 23.

See proposal advertising on page 50

Constr. News page 153.

LEADITE

Trade Mark Registered U.S. Pat. Office



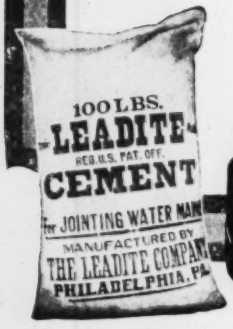
For more than a Quarter Century LEADITE has been successfully used

It has been truthfully said, that "TIME will tell," —and in the case of LEADITE, "Time HAS told." Time *has* told that LEADITE not only meets conditions of bell and spigot water main construction, but that it actually "improves with age."

By Specifying and Using LEADITE,—you are assured of a product of Known Quality and Proven Performance,—a product which has successfully demonstrated its Effectiveness and True Value for more than a quarter of a century.

THOUSANDS OF MILES of bell and spigot water mains are jointed with LEADITE,—which is further evidence of its Economy and Efficiency.

The pioneer self-caulking material for c. i. pipe.
Tested and used for over 30 years.
Saves at least 75%



THE LEADITE COMPANY
Land Title Building - - Philadelphia, Pa.

No Caulking

Sewers (Continued)

N. J., South Bound Brook—Township Com., Township Hall, altering and constructing sewerage plant addition. $25,000. **Maturity probably soon.**

N. J., Spring Lake—Mayor and City Council, improving sewers, outfall pipe 1,000 ft. into ocean, improving sewage disposal plant. $42,500. G. R. Moore, 603 Mattison Ave., Asbury Park, engr.

O., Columbus—City Council preliminary plans 50 m.g.d.c. activated sludge type sewage disposal plant. $4,000,000. R. Alton, engr. in charge, under R. H. Simpson, ch. engr. of Columbus. Noted Oct. 1.

R. I., Bristol—Bids in November 24 in. rein.-con. intercepting sewer and c.i. force mains connecting therewith, etc. Bids later for pumping stations and treatment plant. H. K. Barrows, 6 Beacon St., Boston, Mass., consult. engr. Noted Oct. 22.

S. D., Sioux Falls—For 5,500 lin.ft. sewer from 33rd St. to River. $50,000. **Maturity about Jan. 1.** R. E. Bragstad, city engr.

Tex., Corpus Christi—City, c/o Secretary, soon takes bids storm sewer on Alameda St. G. R. Blackburn, Corpus Christi, engr.

Va., Newport News—Storm sewers in Marshall Ave. $25,000.

W. Va., Parkersburg—City, L. G. Merrill, city engr., soon takes bids sanitary sewerage system, incl. 6- to 15-in. terra cotta pipe, small amount 16 in. c.i. pipe under railroad tracks. $90,000. Morris Knowles, Inc., Westinghouse Bldg., Pittsburgh, engrs.

Wis., Superior—Bids in November, 6,000 ft. trunk line sewer. $130,000.

Tex., San Antonio—Sanitary sewers, $400,000; storm sewer and river improvement, $400,000; street widening and opening, $100,000; street paving, $500,000. I. Ewig, city engr.

Ont., Toronto—For 1,500 ft. concrete or concrete, brick trunk sewer in Avenue Rd. from Lowther Ave. to Bloor St. $54,600. R. C. Harris, City Hall, engr.

Ont., Toronto — York Twp. 8 in. vitr. tile service sewers in Cameron Ave., $7,570; Donald Ave., $6,000; Gilbert Ave., $6,020; Little Blvd., $3,143; Scott Rd., $5,025; Trowell Ave., $4,200. T. S. Scott, 40 Jarvis St., engr.

Ont., Welland—City Council, storm sewers, $50,000. C. L. Coulson, city engr.

Ont., Westboro—A. E. Morris, clk., Nepean Twp. soon takes bids new sewage disposal plant in Sener Area A. $24,000.

BIDS ASKED

Ill., Chicago—Nov. 5, by J. J. Sullivan, clk. Sanitary Dist. of Chicago, 910 South Michigan Ave., furnishing, delivering, erecting North Side Sewerage Treatment Works at Howard St. and McCormick Rd., in village of Niles Center.

Ill., Chicago—Nov. 5, by Sanitary Dist. of Chicago, 910 South Michigan Ave., J. J. Sullivan, clk., digging test pits, making test borings, soil bearing tests, for West Side Sewage Treatment Wks., in Stickney.

Ill., Chicago—Sanitary Dist., of Chicago, 910 South Michigan Ave., J. J. Sullivan, clk., bids about Nov. 1, 15 ft. rein.-con. sewers in Jefferson St. $2,500,000. Noted Jan. 23.

La., New Orleans—See "Waterworks."

Mo., St. Louis—Nov. 10, by Bd. P. Serv., 208 City Hall, Rock Creek Public Outlet Sewer, incl. open rock channel with foul water outlet sewer from end existing Rock Creek Public Sewer to point 100 ft. south of Loughborough Ave., with lateral sewers, manholes, interceptors, 2,070 ft. paved channel 10 ft. bottom width, 2,825 ft. 36 in. circular sewer and closed section to be 795 ft. of 16 ft. and 80 ft. 19 ft. rein.-con. sewers. $105,000. W. W. Horner, city engr.

Neb., Lincoln—See "Contracts Awarded."

N. Y., New York—Nov. 5, by H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., sewers in East 242nd St., Wilder and Murdock Aves.

N. C., Columbia—Nov. 2, by B. S. Davis, mayor, and City Council, J. C. Meekins, city clk., sanitary sewers, incl. 7 manholes, concrete sewer pump pit, 1,000 ft. terra cotta pipe, 96 ft. 10 in. c.i. pipe. R. E. White, Aulander, engr.

Pa., Meadville—Nov. 10, at office G. S. Maxwell, city clk., sewage pumping station, force main, sewage treatment plant, appurtenances. R. L. Phillips, city engr.

Pa., Paxtang—Nov. 27, by Boro Council, A. M. Bell, secy., sanitary sewerage system. E. W. Cowden, Harrisburg, boro engr.; adv. E.N.-R. Oct. 29.

S. C., Greenville—Nov. 3, by North Gate Water & Sewer Sub-Dist. Com., Emaxee Bldg., 34,000 ft. 6- to 15-in. terra cotta, and c.i. sewer lines.

S. C., Greenville—Nov. 3, by Parker Water & Sewer Sub-Dist. Com., Emaxee Bldg., 280,000 ft. 6 to 15-in. terra cotta and c.i. sewer lines.

S. D., Rapid City—Nov. 16, by City, concrete pipe for trunk sewers. $215,000. H. W. Zolper, city engr. A. A. Chenoweth, 320 Paulton Blk., Sioux Falls, consult. engr.

Ont., Sault Ste. Marie — See "Contracts Awarded."

CONTRACTS AWARDED

Ill., Chicago — J. J. Sullivan, clk. Sanitary Dist. of Chicago, 910 South Michigan Ave., West Side Intercepting Sewer, Contr. 4, to W. J. Newman Co., 21 North Curtis St., $1,620,510. Noted Aug. 20.

Neb., Lincoln—City, sewer Sect. 1, Washington and 38th Sts. and Sect. 2, 51st and South Sts., and Sect. 3, 27th St., day labor. $53,000. D. L. Erickson, city engr. Noted Oct. 8.

O., Findlay—Sewage treatment plant, to A. Bentley & Sons Co., Belmont Ave., Toledo, $196,454; intercepting sewer, to F. George, 1657 Mahoning Ave., Youngstown.

Tenn., Memphis — City Council, 17.5 mi. sewers for Bethel Grove, suburb, to M. Harvey, 868 South Bellevue St., $45,735. City furnishes pipe. This corrects report in Sept. 3 issue.

Tex., Houston—City, storm sewers in North Main St. from Airline Dr. to 26th Ave., preceding paving of North Main St. and storm sewers in Montrose School Dist. in Hawthorne, Sul Ross, Greeley, Kipling, Connor and West Main Sts., to Russ Mitchell, Inc., 2701 Texas St., $40,229 and $50,410 respectively; sanitary sewers in Eberhard St. from Buffalo Dr. to West Clay St. and storm sewers in Dunlavy St. between Buffalo Dr. and Welch St., sanitary sewer stubs in Dunlavy St. between Buffalo Dr. and West Gray St., to B. P. Pangs, M. & M. Bldg., $4,070 and $4,053 respectively—sanitary sewer lines in Southern Pacific Passenger Station Sect., on proposed extension of Franklin Ave. between Melnar and Smith Sts., to H. A. Forrest, Houston, $13,963. Grand total $112,725.

Tex., Sulphur Springs—City, c/o W. H. Buchanan, secy., sewage disposal plant, to Vilbig Bros., Eakin St., Dallas. Noted Sept. 24.

Wash., Seattle—Paving between open street car tracks, day labor. $500,000. Municipal Street Railway Dpt. furnishes materials.

Wash., Seattle — City, 2 low service steel tanks, incl. 1,000,000 lb. steel castings, on West Trenton St., West Seattle, to Western Eng. Corp., 5237 East Marginal Way, $52,635.

W. Va., Parkersburg—City, c/o L. G. Merrill, city engr., sanitary sewerage system in Dist. 1, to F. and J. Salvucci, 6001 Callowhill St., Phila., Pa., $108,267. Awarded in September. Noted Aug. 13.

Ont., Sault Ste. Marie—Storm sewers, outlets, opening new streets, rock crushing, day labor, $200,000.

BRIDGES

PROPOSED WORK

N. J., Hanover—Bd. Freeholders Morris Co., Court House, Morristown, steel, rein.-con. bridge over Whippany River between Monroe St. and Cedar Knolls, $25,000. W. S. Hopkins, Court House, Morristown, co. engr.

N. J., Wayne—Bd. Freeholders Passaic Co., Court House, Paterson, steel, concrete bridge over Brook, rear of Wanaque Station on Greenwood Lake R.R. $25,000. G. Ferguson, Court House, Paterson, co. engr.

N. Y., West Islip—Long Island State Park Comm., Babylon, 2,000 ft. suspension bridge over Great South Bay, off Conklins Point, as part of the proposed Cap Tree Island causeway. A. E. Howland, Babylon, ch. engr.

Mo., St. Louis—City, Bd. P. Serv., City Hall, 1,200 ft. rein.-con., steel bridge, 60 ft. wide, to carry Hampton Ave. over St. Louis-San Francisco Ry. and Missouri Pacific Ry. tracks and Manchester Ave. $475,000.

Mo., St. Louis—Bd. P. Serv., E. R. Kinsey, pres., City Hall, 1,800 ft. rein.-con., steel western railroad approach to St. Louis Municipal Bridge across Mississippi River, carrying double-track from point in Terminal R.R. yards near 12th St. to connection with bridge at 8th and Gratiot Sts. $800,000 appropriated. The above approach will be used by Terminal R.R. Assn., Union Sta. C. E. Smith & Co., Railway Exch. Bldg., consult. engrs.

O., Cleveland—Bd. Comrs. Cuyahoga Co. preparing plans piers for bridge Main Ave. To exceed $300,000. Total est. $6,000,000. Wilbur Watson & Associates, 4514 Prospect Ave., engrs.

Wash., Bellingham—See "Excavation, Drainage, Irrigation, Levees, River and Harbor."

Tex., San Antonio—City, c/o C. M. Chambers, mayor, bridges. $150,000. I. Ewig, city engr.

Ont., Welland—City Council new bridge, on North Main St. $85,000. C. L. Coulson, city engr.

BIDS ASKED

Illinois—Nov. 24, by Dpt. Purchases & Constr., Springfield, bridges B3, B4, B5, also substructure, approaches Marseilles Canal Bridge (Contr. B2), and superstructure Cass St. Bridge in Joliet (Contr. B9). Address Div. Waterways, 220 South State St., Chicago, for further information; adv. E.N.-R. Oct. 29.

Ia., Council Bluffs — Nov. 3, at office Auditor Pottawattamie Co., 140 ft. steel span bridge, steel pile abutments, two 122 ft. steel span bridge, creosoted wood abutments, 90 ft. steel span bridge creosoted wood abutments, steel pier, 23,381 cu.yd. earth excav. Address County Engineer or Auditor.

N. Y., New York—Nov. 4, by A. Goldman, comr. Plant & Structures, Municipal Bldg., reconstructing tracks, stringers, etc., on easterly lower deck approach spans Manhattan Bridge.

Ohio—Nov. 6, by O. W. Merrell, state hy. dir., Columbus, encased plate girder bridge, 67.08 ft. span to center pins by 34.5 ft. roadway over Swan Creek and approaches, Sect. A-2 (Bridge) Perrysburg-Holland Rd., State Hy. 57. U. S. Route 20, Springfield Twp., Lucas Co.

Ohio—Nov. 6, by O. W. Merrell, Columbus, dir. hys., 50 bridges (part of 280 bridges planned during winter). J. R. Burkey, ch. engr. bridges has matter in charge, under hy. dir. Noted Oct. 8.

O., Alliance—Bd. Comrs. Stark Co., Canton, bids about Dec. 20, 140 ft. span steel, concrete bridge, 40 ft. roadway on Lexington Rd., Route 80, near here. $25,000. A. M. Wise, Canton, engr.

Illinois—Nov. 2, by State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, one 37 ft. and four 33 ft. span rein.-con. girder bridges, Route 4, Sect. 430-VB—widening one 36 ft. and two 33 ft. span rein.-con. girder bridge, Route 5, Sect. 7Y-V—25 ft. rein.-con. slab bridge, Route 22, Sect. 23-RB—rein.-con. superstructure, Route 46, Sect. 462-VB—One 64 ft. steel 266 ft. fifteen 91 ft. and six 83 ft. span steel superstructure, Route 46, Sect. 462-VC, all Cook Co.—2 rein.-con. culvert extension, Route 4, Sect. 65-B—5 rein.-con. culvert extensions, Route 11, Sect. 66-B, 3 rein.-con. culvert extensions, Route 11, Sect. 47-B, all Madison Co.—seven 60 ft. span rein.-con. girder bridge, Route 9, Sect. 48-B Peoria Co.—25 ft. rein.-con. slab bridge, paving approaches, Route 26, Sect. GR-B Lake Co.—44 ft. rein.-con. girder bridge, retaining walls, earth approaches, Route 53, Sect. 533-H—fifteen 50 ft. span rein.-con. girder bridge, retaining walls, paving approaches, Route 53, Sect. 534-H—three 50 ft. span rein.-con. girder bridge, Route 55, Sect. 552-B all DuPage Co.—two 40 ft. span rein.-con. girder bridge, Route 17, Sect. 115-B, Lee Co.—repairing, widening six 14 ft. span, one 24 ft. span bridge, Route 78, Sect. 169-VB, Carroll Co.—two 40 ft. span, six 32 ft. span, five 20 ft. span rein.-con. girder bridge also 3 rein.-con. box culverts, Route 88-C, Sect. 105-B, Marshall and Putnam Counties—one 33 ft., two 37 ft. span rein.-con. girder bridge, Route 95, Sect. 122-VB, McDonough Co.—rein.-con. substructure and six rein.-con. girder approach span, Route 97, Sect. 142-B—three 100 ft. span steel superstructure, Route 97, Sect. 142-C, Fulton Co.—one 50 ft. and three 30 ft. span rein.-con. girder bridge, Route 100, Sect. 124-B, Calhoun Co.—3 rein.-con. box culverts, extensions, Route 101, Sect. 120-XB, Schuyler Co.—45 ft. rein.-con. girder bridge, Sect. 101-B—two 43 ft. span steel I-beam bridge, twelve 43 ft. span rein.-con. substructure, eleven 43 ft. span R-beam approach spans, also extending three 45 ft. and two 20 ft. span bridge, Sect. 102-B—one 200 ft. span steel superstructure, Sect. 102-C, all Route 124, Sangamon Co.—repairing, widening seven 15 ft. span timber bridge, Route 146, Sect. 111-VB, Johnson Co.—fifty 20 ft. span steel I-beam bridge on creosoted piles, gravel surfacing approaches, Route 150, Sect. 136-B, Alexandria Co.—also in market 18,000 lin.ft. creosoted piles. F. T. Sheets, ch. hy. engr.

Maryland—Nov. 3, by State Roads Comm., G. C. Uhl, chm., Baltimore, structural steel superstructure for bridge over Deer Creek on road from Federal Hill to Clermont Mills, Contr. H-141-44, Harford Co.; substructure proposed bridge over Monocacy River on road from Frederick to Libertytown at Ceresville, Contr. F-175-57, Frederick Co. H. Willnar, Jr., Federal Reserve Bank Bldg., Baltimore,; adv. E.N.-R. Oct. 29.

Ont., Sudbury—City, P. Fenton, mayor, City Hall, taking bids concrete, rein.-con. bridges over Junction Creek, Elm St. and Nadens Creek, Beech St. $25,825. Wm. McMullen, Mackie Bldg., engr. Noted Oct. 8.

CONTRACTS AWARDED

Calif., San Francisco—C. H. Purcell, ch. engr. State Hy. Comm., Sacramento, and San Francisco Bridge Co., 500 Sansome St., performance of all necessary work and furnishing materials, equipment for investigating sites for San Francisco Bay Bridge, incl. diamond drill and jet borings, driving casings and test piles, loading piles with test loads, to Duncanson-Harrelson Co., de Young Bldg., $63,600. Total est. $72,000,000. Noted Oct. 1.

Md., Baltimore—Bd. Awards, repairing bridge, over middle branch Patapsco River, Hanover St., to V. A. Pyles & Co., Brooklyn, $53,874. Noted Oct. 1 Daily.

Michigan—W. J. Kingscott, div. engr., at office Muskegon Co. Road Comm., Muskegon, S. R. Br. 1 of 61-13-23, Contr. 2, 2 rein.-con. abutments, steel deck girder, two 3 ft. sidewalks, Muskegon Co., to H. E. Culbertson Co., 2001 Wash. Bld. Bg., Detroit, $141,103; S. R. Br. 1 of 61-13-23, Contr. 1, 2 rein.-con. abutments, steel deck girder, two 3 ft. sidewalks, Muskegon Co., to Fort Pitt Bridge Wks., Massillon, O., $27,468. Noted Oct. 1.

Minnesota—State Hy. Dpt., St. Paul, Bridge 5122, on S.P. 35-22, Grand Rapids, to Lovering Longobtham Co., 605 Builders Exchange Bldg., St. Paul, $62,436; Bridge 5180, S.P. 23-28, Richmond Co., to E. A. Kramme Co., 3200 East 8th St., Des Moines, Ia., $18,575. Noted Oct. 8.

Missouri—State Hy. Dpt., Jefferson City, to Koss Constr. Co., 205 Old Colony Bldg., Des Moines, Ia., bridges in Vernon Co. $9,217; to H. D. Thomas, Fulton, Gasconade Co. $1,483—to A. E. Keith Constr. Co., 614 City Bank Bldg., Kansas City, Bates Co. $9,199—to H. C. Botsford, Kansas City, over Chicago, Rock Island and Pacific R.R. tracks, $8,915; over Grindstone Overflow, $7,516; over west fork Lost Creek, $11,188; over Grindstone Creek, $20,047; over Big Lost Creek, $14,418; over Big Lost Creek overflow, $12,725, all foregoing DeKalb Co.—to Kesl & Sons, Edwardsville, Ill., over Watkins Rd., $7,564; from Bissel to Walker Rd. $12,324; over Moline Creek, $12,956; over Route 99TR $11,955; over Watkins Creek, $3,943, all foregoing in St. Louis Co. Grand total $143,450. Noted Sept. 9.

Mo., St. Louis — Missouri Pacific R.R. Co., E. A. Hadley, ch. engr., Missouri Pacific Bldg., replacing 100 ft. 3-track concrete arch bridge over River Des Peres, below here, to Winston Bros. Co., Buder Bldg., E-t. $300,000.

N. J., Bound Brook—Bd. Freeholders Middlesex Co. (New Brunswick) and Somerset Co. (Somerville) Court House, New Brunswick, 125 ft. span steel, rein.-con. bridge over Green Brook at Main St., to A. E. Smith, 220 Park Ave., Plainfield, $52,444. Noted Aug. 12.

O., Mentor (br. Painesville) — Bd. Comrs. Lake Co., rein.-con., steel girder bridge Mentor Harbor Blvd., to C. A. White Constr. Co., Willoughby, $17,000. Est. $27,200.

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Bridges (Continued)

Okla., Tulsa—See "Streets and Roads."

Pa., Pittsburgh—See "Streets and Roads."

South Carolina—See "Streets and Roads."

Texas—G. Gilchrist, state hy. engr., Austin, 3 rein.-con. bridges over Alkali, Buffalo Creeks and Elm Fork of Brazos River, Hy. 83, State Project 917-E, Fisher Co., to Balfanz Constr. Co., Abilene, $22,043—rein.-con. bridge over Cypress Creek, Hy. 27, F.A.P. 405, reopened, Sect. A, Kendall Co., to Interstate Constr. Co., Box 143, Fort Smith, Ark., $21,485—bridge over Comanche Creek, Hy. 27, F.A.P. 618-G, Pecos Co., to Kelly & Isaacs, Waco, $18,814. Est. $25,000 each. Grand total $62,343. Noted Oct. 14 Daily.

STREETS AND ROADS

BIDS ASKED

Alabama—Nov. 18, by State Hy. Comn., Montgomery, grading, guard rail, grass planting, concrete, bituminous concrete, rock asphalt, sheet asphalt paving; 266,000 sq.yd. road from Mobile to Mississippi State line.

California—Nov. 4, by C. H. Purcell, engr., State Hy. Comn., Sacramento, grading, oil treated selected material surfacing 10.9 mi. road between Devere and Alray, San Bernardino Co.

California — Nov. 4, by State Hy. Comn., Sacramento, grading, oil treated selected material surfacing 10.9 mi. road between Devore and Alray, San Bernardino Co. C. H. Purcell, hy. engr.

Calif., El Segundo—City Council, rejected bids Sept. 30, improving Imperial Hy., incl. 28,000 cu.yd. grading, shaping, rein.-con. box culvert, 342,000 sq.yd. 6 in. bitumuls full penetration paving. Will readvertise. R. T. Hutchins, City Hall, engr.

Calif., San Diego — Bd. Supervs, San Diego Co., taking bids oil mix surfacing 14.5 mi. County Road Route 19 from San Pasqual to Ramona. E. R. Childs, San Diego, co. surv.

Delaware — Nov. 10, by State Hy. Dpt., Dover, clearing, grubbing, grading, concrete paving 2.8 mi. Farnhurst-Wilmington Rd., Contr. 209, New Castle Co.—5.57 mi. Contr. 176, Castle Co.—3.83 mi. Frankford-Roxana Rd., Contr. 194—4.1 mi. Georgetown-Springfield X Rds., Contr. 177, all foregoing in Sussex Co.—grading, terra cotta sewer, catch basin, drop inlet castings, concrete sidewalks, 6,500 ft. Holly Oak-Claymont Rd., Philadelphia Pike, Contr. 210, New Castle Co.—2,720 ft. Camden-Camp Meeting Woods, Contr. 211, 4,300 ft. Clayton-Smyrna Rd., Contr. 212, both Kent Co.—1,025 ft. Blade-Seaford Town Lines, Contr. 213, Sussex Co.—1,600 ft. Millsboro Rd. towards Harmon School, Contr. 214—Barkers Landing Causeway, Contr. 215, New Castle Co.

Illinois—Nov. 2, by State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, concrete, bituminous filled brick on concrete, bituminous concrete (fine or coarse graded aggregate type) on concrete surfacing 0.9 mi. Route 8, Sect. 10, 40 and 20 ft.—0.29 mi. Sect. 46-X, 20 ft.—0.5 mi. Sect. 46-X-1, 20 and 40 ft.—0.53 mi. Route 88, Sect. 126, 20 ft.—0.28 mi. Sect. 48, 20 and 40 ft.—1 mi. Sect. 48-X, 20 ft., all Route 9, Peoria Co.—2.69 mi. Route 86-Y—2.92 mi. Sect. 881-Y, both Route 19—1 mi. Route 46, Sect. 464-MY—5 mi. Route 49, Sect. 146-X, all foregoing 40 ft.—6.5 mi. Route 52, Sect. 524, 20 and 40 ft.—1.74 mi. Route 53, Sect. 539-X, 20 and 40 ft.—5.37 mi. Route 58, Sect. 584-Y—3.02 mi. Route 60, Sect. 120-Y—0.28 mi. Route 63, Sect. 631-X-1, all Cook Co., all foregoing 40 ft.—4.65 mi. Route 47, Sect. 106, 20 ft., Kane Co.—0.27 mi. Route 47, Sect. 125-X, 18 ft., Livingston Co.—7.35 mi. Route 46, Sect. 137, 20 ft. Christian and Montgomery Counties—4.43 mi. Route 53, Sect. 534-X, 20 ft.—1.74 mi. Route 54, Sect. 542, 40 ft.—1.06 mi. Route 55, Sect. 552, 20 ft., all DuPage Co.—10.84 mi. Route 71, Sect. 115, Lee and De Kalb Counties—3.23 mi. Sect. 102—2.93 mi. Sect. 102-X—2.16 mi. Sect. 103—1.93 mi. Sect. 103-X—4.02 mi. Sect. 104, all Route 85, Mercer Co.—5.97 mi. Route 99, Sect. 105, McDonough Co.—2.31 mi. Route 104, Sect. 143-X, Christian Co.—7.68 mi. Route 120, Sect. 115, Piatt Co.—2.51 mi. Route 127, Sect. 103, Montgomery Co.—4.96 mi. Route 130, Sect. 101, Jasper Co.—11.02 mi. Route 146, Sect. 106, Union Co.—8 mi. Sect. 107—0.38 mi. Sect. 107-S, both Route 146, Johnson Co.—3.44 mi. Route 134—3.42 mi. Route 135, both Route 150, Alexandria Co.—0.11 mi. Route 156, Sect. 124-X, McLean Co., all foregoing 18 ft. wide—grading 0.32 mi. Route 18, Sect. 8-YA, Cook Co.—3.58 mi. Route 89-C, Sect. 105-A, Marshall Co.—7.68 mi. Route 97, Sect. 142-A, Knox and Fulton Counties—6.91 mi. Route 100, Sect. 124-A, Calhoun Co.—2.43 mi. Sect. 101-A—5.19 mi. Sect. 102-A, both Route 124, Sangamon Co.—6.76 mi. Route 147, Sect. 116-A, Johnson and Pulaski Counties. F. T. Sheets, ch. hy. engr.

Ind., Brookville — Nov. 2, by Bd. Comrs. Franklin Co., macadam surfacing C. E. Doerflein Rd. $25,000. W. F. Flack, Brookville, co. aud.

Ind., South Bend—Nov. 9, by Bd. Comrs. St. Joseph Co., concrete surfacing Cedar and Osborne Rds., $25,000. F. P. Crowe, South Bend co. aud.

Ind., New Albany—Bd. Comrs. Floyd Co. rejected bids Sept. 19, grading, paving 20,192 ft. Old Corydon Rd., $32,410. Noted Sept. 3.

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Maryland—Nov. 3, by State Roads Comn., G. C. Uhl, chn., Baltimore, concrete paving 5.72 mi. hy. along Oldtown Paw Paw Rd. from end of Contr. A-87 at Oldtown to Town Creek, Contr. A-110-62, Allegany Co. H. Williar, Jr., Federal Reserve Bank Bldg., Baltimore, engr.; adv. E.N.-R. Oct. 29.

Michigan—Nov. 3, by W. J. Kingscott, div. engr., 309 McNair Bldg., Kalamazoo, grading, drainage structures 2.667 mi. MO8-24C-1, Barry and Kent Counties, for State Hy. Comn., Lansing.

Michigan—Nov. 3, by J. T. Sharpensteen, div. engr., Escanaba, grading, shaping, drainage, 2 course gravel surfacing 4.579 mi. MO22-27C-1, Dickinson Co.—gravel resurfacing 8.761 mi. FO7-4C-4, Baraga Co.—grading, drainage, FO42-13C-1, Keweenaw Co.—1.42 mi. FO55-2, Contr. 3, Menominee Co., for State Hy. Comn., Lansing.

Michigan—Nov. 4, by W. J. Kingscott, div. engr., 213 Watson Bldg., Grand Rapids, grading, shaping, drainage, concrete paving 3.579 mi. MO34-16C-3, Ionia Co., for State Hy. Comn., Lansing.

Michigan—Nov. 5, by A. L. Burridge, div. engr., Cadillac, grading, shaping, drainage, 2 course gravel surfacing 0.667 mi. MO67-3C Contr. 1, Osceola Co.; 14 x 10 ft. slab culvert, MO65-8C-2, Ogemaw Co., for State Hy. Comn., Lansing.

Michigan—Nov. 5, by H. G. Oakes, div. engr., Plymouth, grading, shaping, drainage, concrete paving 2.518 mi. FO81-25C-1, Washtenaw Co.; 27 ft. T-beam culvert, MO50-26C-1, Macomb Co., for State Hy. Comn., Lansing.

Michigan—Nov. 6, by H. W. Hagaman, div. engr., 208 Kresge Bldg., Port Huron, grading, drainage structures 1.262 mi. MO44-26C-2, Lapeer Co.

Minnesota—Nov. 10, by State Hy. Dpt., St. Paul; concrete paving 211,600 sq.ft. S.P. 2-34, Div. B, F.A.P. 386-A, S.P. 2-28, Sect. 1, F.A.P. 86 and S.P. 2-28, Sect. 2, F.A.P. 416-C—205,000 sq.yd. S.P. 2-40, Sect. 1, Div. A, F.A.P. 416-B—138,300 sq.yd. S.P. 2-40, Sect. 1, Div. B, F.A.P. 416-B and S.P. 2-40, Sect. 2, F.A.P. 416-A—89,800 sq.yd. S.P. 3-60, Sect. 2, F.A.P. 11 and S.P. 3-60, Sect. 3, F.A.P. 19—250,000 sq.yd. S.P. 7-23, F.A.P. 408-B, S.P. 7-44, F.A.P. 408-C and S.P. 7-27, Sect. 2, F.A.P. 408-D—193,000 sq.yd. S.P. 8-38, Div. B, F.A.P. 204, S.P. 835, F.A.P. 431 and S.P. 8-27, Div. A, F.A.P. 429 — 194,000 sq.yd. S.P. 20-36, F.A.P. 97.

Nevada—Nov. 12, by State Hy. Comn., Carson City, grading, drainage, surfacing 9.8 mi. road between Lahontan and Leeteville. S. C. Durkee, state engr.

N. Y., Long Island City—Nov. 2, by G. U. Harvey, pres., Queens Boro, Queens Subway Bldg., grading, curbing, sidewalks, stone block guttering 97th St. and Far Rockaway Blvd.; grading, curbing, sidewalks, sheet asphalt on concrete paving North Central, South Central, North and South Roadways, 34th and 103rd Aves., 42nd, Inwood, 125th and 43rd Sts.

N. Y., New York—Nov. 5, by H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., grading, curbing, sidewalks on Barnes and Edison Aves.

N. Y., St. George—Nov. 4, by J. A. Lynch, pres. Richmond Boro, Boro Hall, grading, curbing, brick gutters on Spring St.—granite block repaving South St.—cinder and broken stone on dirt surfacing Bowles Ave. and Oceanview Pl.

South Carolina—Nov. 3, by State Hy. Dpt., Columbia, grading, drainage structures, bituminous surfacing 1.8 mi. Route 49 from Little River to state line and 5.9 mi. same route from intersection with Route 40 to Loris, State Projects 612 and 768-A, Horry Co. Owner furnishes cement.

Tex., Brownsville—Nov. 6, by Cameron Co., c/o O. C. Dancy, judge, concrete paving 8.8 mi. A-44 San Jose Ranch Rd., 18 ft. W. O. Washington, Brownsville, co. engr.

Virginia—Nov. 2 by State Hy. Dpt., Richmond, concrete surfacing 14.083 sq.yd. Project 31—1,634 sq.yd. Project 668—36,279 sq.yd. Project 703—macadam surfacing 33,375 sq.yd. Project 603—grading, drainage structures 4,660 sq.yd. Project 494—double box culvert, Project 225. H. G. Shirley, hy. engr.

Wash., Montesano—Nov. 9, by Comrs. Grays Harbor Co., clearing, grubbing, grading Lateral Hys. 7 and 9. J. H. Kirkwood, Montesano, co. engr.

Wash., Seattle—See "Contracts Awarded."

Ontario—Nov. 9, by R. M. Smith, deputy minister Hys., Toronto, grading, structures 6.5 mi. Actinolite Rd. E., Contr. 31-74—7 mi. Kalader W., Contr. 31-75—6 mi. Kalader Rd. W., Contr. 31-76—5.5 mi. Arden Rd. W., Contr. 31-77—7 mi. Arden Rd. E., Contr. 31-78—6 mi. Oso Station Rd. W., to Frontenac Rd., Contr. 31-79—7 mi. Mayberley Rd. W., Contr. 31-80—9 mi. Mayberley E., Contr. 31-81. W. F. Noonan, Brockville, W. L. Saunders, Port Hope and C. A. Robbins, Toronto, resident engrs.

Ont., Peterborough—See "Contracts Awarded."

CONTRACTS AWARDED

California — C. H. Purcell engr. State Hy. Comn., Sacramento, grading, concrete surfacing 5.8 mi. road between Los Berros Creek and Arroyo Grande San Luis Obispo Co. to Frederickson & Watson and Frederickson Bros., 354 Hobart St., Oakland, $264,016. Noted Sept. 22.

California — State Hy. Comn., Sacramento, grading, concrete paving 2.7 mi. road in Placer Co., 20 ft., to Hanrahan Co., Hobart Bldg., San Francisco, $102,962; grading, selected material surfacing road between Rocky Creek and San Remo, Monterey Co., to D. MacDonald, 1118 G St., Sacramento, $169,991. Noted Oct. 15.

Calif., Los Angeles—Los Angeles Co., grading, concrete paving 275,000 sq.ft. Foothill Blvd. east of Pasadena Ave., to J. E. Haddock, 3561 East Foothill Blvd., Pasadena, $59,080.

Colorado—State Hy. Dpt., Denver, paving 2 mi. U. S. Hy. 40 through Idaho Springs, to J. F. Roberts Constr. Co., Tram Bldg., Denver, $93,750.

Conn., New Britain—Bituminous macadam paving Stanley St. from Kelsey St. to town line, to Bd. Pub. Wks. Est. $25,000.

Ia., Elkador—Clayton Co., surfacing secondary road system, to Interstate Constr. Co., Madison, Wis., $23,615, and to C. Pape, Dubuque, $3,075. Noted Oct. 1.

Kansas—State Hy. Comn., Court House, Lyons and Mankato, light type surfacing 5.549 mi. road in Jewell Co., to D. G. Hansen, Logan, $3,059—9.081 mi. Barton Co. and 12.408 mi. Rice Co., to Cook & Cone, Ottawa, $2,221 and $3,973 respectively — 1 bridge, grading approaches, Shawnee Co., to Orr Constr. Co., Lecompton, $17,177 — cleaning and painting metal work, repairing floor bridge, Edwards Co., to St. Josephs Structural Steel Co., St. Joseph, Mo., $6,882. Grand total $33,312. Noted Oct. 1.

Kentucky—State Hy. Dpt. Frankfort, grading, drainage structures using 1st class double strength pipe 5.286 mi. Martin-Weeksbury Rd., Floyd Co., to Campbell-Johnson Co., Pikeville, $43,830. Noted Sept. 24.

Maryland—State Roads Comn., G. C. Uhl, chn., Baltimore, 0.8 mi. macadam paving 0.8 mi. and gravel surfacing 1.97 mi. Contr. H-139-42, to Development & Contg. Co., American Bldg., Baltimore, $11,350—concrete paving 2.68 mi. Contr. H-122-44, to P. Reddington & Son, 2 East Lexington St., Baltimore, $61,859, both Harford Co.—concrete shoulders, combination curb and guttering 0.26 mi. Contr. P-196-811, to Southern Maryland Contg. Co., 20 East Lexington St., Baltimore, $2,950—along Balto-Wash. Blvd. in front of University of Maryland, to Security Contg. Co., Washington, D. C., $4,684, both Prince George Co. Grand total $80,843.

Maryland—State Roads Comn., G. C. Uhl, chn., Baltimore, grading, drainage, 1.01 mi. Contr. A — 108-64, Allegany Co., incl. superstructure for bridge, to M. F. McCabe & Co., Salisbury, Pa., $17,750. Noted Oct. 8.

Maryland—State Roads Comn., G. C. Uhl, chn., Baltimore, macadam paving 1.52 mi. state hy. along Churchville-Dublin Rd. from end of Contr. H-82 at Trappe Church to Conowingo Rd., Contr. H-123-42, Harford Co., to T. B. Gatch & Sons Contg. & Building Corp., Belair Rd., Baltimore, $27,854. Noted June 11.

Mass., Boston—Sheet asphalt paving Carrolton St., to Boston Granolithic Co., 32 Hull St. Est. $25,000.

Mass., Boston—Park Dpt., 33 Beacon St., grading, concrete walks and walls Stanley Ringer and William J. Barry Playgrounds, to Guaranty Constr. Co., 161 Harvard St., Allston, $24,000. Est. $25,000.

Mass., Boston—Dpt. P. Wks., J. A. Rourke, comr., bitulithic paving Summer St., to C. Reppucci & Co., 10 Garden Court St., $27,046.

Mass., Chelsea (br. Boston)—Street Dpt., City Hall, artificial stone sidewalks, to J. McColgan, Bway., $0.22 with driveway. Est. $25,000.

Michigan—State Hy. Comn., Lansing, widening existing pavement, concrete paving 1.996 mi. M013-26C-1, city of Battle Creek to City of Battle Creek, $25,000.

Missouri—State Hy. Dpt., Jefferson City, to H. C. Botsford, Kansas City, graveling 3.254 mi. Maysville-Weatherby Rd. R. 6, Sect. 7, DeKalb Co., $20,151; 3.303 mi. Sect. 8, same road $25,948; 20.29 mi. Sect. 9, same road, $23,339—to Hofner Rock & Constr. Co., Tibbetts, 4.935 mi. Route 4 to Readsville Rd. R. SD, Sect. 2B, Callaway Co. $3,100; 5 mi. Sect. 1A, same road $3.150 — to Korbmaker Co., Excelsior Springs, 2.697 mi. Maryville-Ravenwood Rd., R. 18, Sect. 13A, Nodaway Co. $1,113; 3.828 mi. Sect. 14A, same road $1,321; 1.034 mi. Sect. 14B, same road $335; 4.6 mi. Novinger-Sullivan Rd., R. 6, Sect. 38, Adair Co., $2,600; 4.506 mi. Sect. 39, same road $2,778—to Service Constr. Co., Poplar Bluff, 2.879 mi. Route 49 to Minimum, R. SC, Sect. 1, Iron Co. $11,379; 2.466 mi. same road $9,477—to M. E. Gilliozi, Monett, 2.802 mi. Steelville-Berryman Rd., R. 8, Sect. 6, Crawford Co. $14,400; 2.802 mi. Sect. 5, same road $24,431; 3.586 mi. R. 8, Sect. 2, same road $21,401—to H. Tidd, Hutchinson, Kan., 1.132 mi. Brookfield to airport, Linn Co. $2,504—to Robertson & Ellis, Poplar Bluff, 3.674 mi. Route 67-Wayne County, R. S. W., Sect. 1A, Butler Co. $2,583; 3.814 mi. Sect. 2A, same road $2,675—to H. D. Thomas, Fulton, 2.894 mi. Gasconade Co. $11,791; 4.972 mi. Lawrence Co. $15,608 — to H. H. Ruddell, Springfield, 2.986 mi. Bunker-Stone Hill Rd., R. 72, Sect. 8, Reynolds Co. $11,906; 4.786 mi. Sect. 10, same road $26,244; 4.574 mi. Sect. 9, same road, Dent Co. $27,401 — to Richmond Constr. Co., Advance, 2.655 mi. Farmington-Riverside Rd., R. SA, Sect. 1A, New Madrid Co. $1,908; 2.481 mi. Sect. 2A, same road $1,773—to Gaines Bros., Eldon, 1.33 mi. Steelville-Phelps Co. Rd., R. SA, Sect. 1A, Crawford Co. $975; 3.689 mi. Sect. 2B, same road $2,572; 3.404 mi. Sect. 3A, same road $2,373; chat surfacing 3.872 mi.

Streets and Roads (Continued)

Route 70 to St. Francois Co., R. S. H., Sect. 2A, Madison Co. $1,373; 3.944 mi. Sect. 1A, same road $1,308—to A. E. Keith Constr. Co., 614 City Bank Bldg., Kansas City, 3.392 mi. Kansas Line-Butler Rd., R. 52, Sect. 1, Bates Co. $27,559; 3.345 mi. Sect. 2, same road $19,290—to Jewett & Hardy, Shelbourne, crushed stone paving 3.942 mi. St. Joseph Rd. S., R. SV, Sect. 1, Buchanan Co. $22,727; 4.05 mi. same road $14,531—to Chaney & Amyx, Branson, 1.562 mi. Republic Rd. S & R. S. P. Sect. 1, Green Co. $3,508; 3.002 mi. same road $7,945; 3.008 mi. Sect. 2, same road $13,016—to J. L. Pohl, Nevada, 1.304 mi. Napton-Route SH Rd., R. SE, Sect. 3k, Saline Co. $5,980—to R. H. Sharp, Reeds Springs, graveling, crushed stone surfacing 4.728 mi. Reeds Spring Rd. S. Route 13, Sect. 11, Stone Co. $22,151; 3.746 mi. Sect. 12, same road $14,642—to Lahar Constr. Co., Boonville, crushed rock surfacing 4.547 mi. Mount Vernon-Aurora Rd., R. SE, Sect. 1, Lawrence Co. $10,373; 1.856 mi. Sect. 12 same road $5,990—to J. Kesl & Sons, Edwardsville, Ill., grading, concrete paving 2.683 mi. New Jamestown Rd., R. 99TR, Sect. 2 $52,799; 1.095 mi. Bellefontaine Rd.-Route 99, R. 77TR, Sect. 2 $35,330; 3.389 mi. Route 77-St. Louis Rd., R. 99TR, Sect. 1 $135,755, all St. Louis Co.—to Koss Constr. Co., 205 Old Colony Bldg., Des Moines, Ia., 4.477 mi. Kansas Line Rd. E. R. 54, Sect. 1A, Vernon Co. $90,875, Grand total $766,388. Noted Sept. 10.

Mo. St. Louis—Bd. P. Wks., City Hall, vibrolithic concrete paving Grape and Oriole Aves., to J. F. MacMahon Constr. Co., 916 Buder Bldg., $7,495 and $6,258 respectively — constructing Cold Water Diversion Channel at St. Louis Municipal Flying Field, to T. Knobel, 419 Jefferson St., St. Charles, $7,648—Sect. H3, River Des Peres Drainage Work, to S. Kraus Co., 645 Edmund St., $6,636. Grand total $28,037.

Nebraska—Dpt. P. Wks., Lincoln, to G. W. Condon, 223 Grain Exch. Bldg., Omaha, patrol graveling, repairing bridge on Patrol 219, over Platte River, Cass and Sarpy Counties, $3,133—to Roberts Constr. Co., 404 1st Natl. Bank Bldg., Lincoln, 11 mi., Patrol 220 and 182, Jefferson Co. $3,787; 1.4 mi. Patrol 417, Greeley Co. $491; 22.6 mi. Patrols 701 and 713, Custer Co. $9,718; 11.6 mi. S.A.P. 623H, Franklin Co. $7,364—to S. L. Sokol, Duncan, 1.8 mi. Patrols 220 and 260, Butler and Polk Counties $680—to Yant Constr. Co., 1146 Omaha Natl. Bank Bldg., Omaha, 15.9 mi. Patrol 237, Saunders Co. $4,956; sand graveling 6 mi. S.A.P. 690, Richardson Co. $5,346—to Abel Constr. Co., 308 Terminal Bldg., Lincoln, grading 3.9 mi. Patrol 242, Lancaster Co. $1,310; 9.2 mi. Patrol 411, Howard and Sherman Counties, $2,641; sand graveling 2.2 mi. F.A.P. 172, Greeley Co. $1,612; 8 mi. S.A.P. 627G, Dawson Co. $6,301—to E. W. Nichols, Fremont, 5.3 mi. Patrols 407 and 430, Howard Co. $1,260—to D. Camp, Gibbon, 15.6 mi. Patrols 419 and 426, Hamilton and Polk Counties $2,268—to W. Lunzer, Gibbon, 7.2 mi. Patrol 434, Hall Co. $1,782—to Mid-State Constr. Co., Hastings, 2.1 mi. Patrol 446, Adams Co. $365; culverts, roadway and driveway pipe S.A.P. 611G, Adams Co. $780—to W. Krotter, Stuart, 1.3 mi. Patrols 856 and 857, Cherry Co. $3,286—to Dodson & Robison, Lincoln, paving 0.6 mi. F.A.P. 203-C, Antelope Co. $16,882—to D. Quinton, Kearney, culverts, roadway and driveway pipe Harlan and Furnas Counties $616—to Humphal & Cockbill, Atkinson, sand graveling 2.6 mi. F.A.P. 60D, Howard Co. $2,238; 9.9 mi. S.A.P. 60L, Howard Co. $5,312—to Moran Constr. Co., 2915 North 16th St., Omaha, 1.3 mi. F.A.P. 172, Cuming Co. $46,612—to Firman L. Carswell Mfg. Co., Grand Island, driveway pipe on Projects 30A, 688B and 688C, Harlan and Furnas Counties, $515; 1.3 mi. Cuming Co. $179; roadway and driveway pipe F.A.P. 293B, Red Willow Co. $336—to Western Bridge & Constr. Co., 3867 Leavenworth St., Omaha, sand graveling 13 mi. Red Willow Co. $19,767; 10.5 mi. Dixon Co. $9,431—to Diamond Eng. Co., Grand Island, 3 bridges, surfacing F.A.P. 293B, $55,068—to F. L. Busche, 4118 North 30th St., Omaha, graveling 7.5 mi. Platte and Madison Counties $7,364—to Einung Bros., Wayne, 12.2 mi. S.A.P. 648H, Dodge Co. $8,954. Grand total $230,354. Noted Oct. 8.

N. J., Neptune City—City Council, City Hall, grading, concrete paving Sylvania Ave., to D. S. Tyson, Trenton. Est. $25,000.

N. J., New Brunswick—Middlesex Co., paving Amboy Ave., Woodbridge, to Liddle & Pfeiffer, Perth Amboy, $7,936—Mount Mills bridge approach and Bordentown Turnpike, to W. J. Wilk, New Brunswick, $1,475 and $3,389 respectively—Raritan St., Somerville, to Utility Constr. Co., New Brunswick, $10,359. Grand total $23,159.

North Carolina—State Hy. Comm., Raleigh, clearing, grading, drainage, plain concrete and asphaltic paving 5.2 mi. hy. Guilford Co., to Noel Constr. Co., Charlotte, $108,832.

O., Cleveland—Cuyahoga Co., vitr. brick paving Noble Rd. 3, to Loesch & Green Constr. Co., State Rd., $21,500. Est. $26,800. Noted Oct. 15.

Okla., Tulsa—City Comrs., E. Logan, clk., earth approaches for bridge over Arkansas River at 21st St., to Rucks Brandt Constr. Co., Thompson Bldg., $114,054. Est. $115,000. Noted May 14, under "Bridges."

Pennsylvania — State Hy. Dpt., Harrisburg, grading, concrete surfacing Route 247, Fayette Co., to Donora Constr. Co., Donora, $8,590. Noted Aug. 27.

Pennsylvania — State Hy. Dpt., Harrisburg, grading, rein.-con. 19,380 sq.yd. Derry Twp., Westmoreland Co., to A. Edemiller, New Alexandria, $56,092. Noted July 30.

Pa., Pittsburgh—City Council, grading, curbing, paving Iowa St., to A. F. Jordano, 1201 West Liberty Ave., $10,431—Anderson St., to D. Pavia, 331 Ladson St., $12,706—Rothman St. and Mulberry Way, also Bingham St., to H. Butch, 2 Emma St., $15,751 and $6,753 respectively—Labelle St., to M. O'Herron Co., South 21st and McKean Sts., $13,430—Sakon Way and grading, paving 10th St., to Schenley Constr. Co., 40 Boundry St., $8,843 and $1,913 respectively—Eetamus Way, to J. Masi, 6522 Deary St., $1,158—retaining wall on Kilbourne St. and concrete sidewalks on Suburban Avenue Bridge, to United Eng. & Constr. Co., Investment Bldg., $891 and $1,320 respectively—structural repairs to South Graham Street Bridge over Pennsylvania R.R., to W. S. Rae, Oliver Bldg., $716. Grand total $73,912.

South Carolina—State Hy. Comm., Columbia, top soil surfacing 15 mi. Route 163, York Co., to Sutton Bros., Stahlman Bldg., Nashville, Tenn., $58,595—road Abbeville Co., to C. M. McKenzie, Abbeville, $3,294—paving approaches to bridges in Greenwood and McCormick Counties, to C. Y. Thomason, Greenwood, $2,704—Lee Co., to Boyle Road & Bridge Co., Sumpter, $3,040—Spartanburg Co., to Wannamaker & Wells, Orangeburg, $892—Chesterfield Co., to Carolina Contg. Co., Columbia, $10,226—constructing bridge in Aiken Co., to Hobbs-Peabody Constr. Co., Charlotte, N. C., $3,291—2 bridges in Aiken Co., to Goodwyn & Hurt, Montgomery, Ala., $22,421—bridge in Darlington Co., to Kiker & Young, Reidsville, N. C., $19,536. Grand total $123,999.

Texas—G. Gilchrist, state hy. engr., Austin, gravel base course surfacing 13.014 mi. F.A.P. 558-D, Culberson Co., to Lone Star Constr. Co., 1735 Milam Bldg., San Antonio, $56,949 est. $120,000—13.746 mi. S.P. 917-A, B and D, Fisher Co., to McClure & Denison, Tecumcaria, N. M., $75,072, est. $116,000—reconditioning present roadbed and placing concrete pavement, 9.937 mi. S.P. 670-C, Bell Co., to J. B. Dunlap Co., Dallas, $128,834 est. $200,000—crushed stone and gravel base course surfacing 5.751 mi. S.P. 735-A, Unit 1, DeWitt Co., to Cocke & Braden, Marshall, $39,260 est. $58,000—2 course crushed conglomerate base course surfacing 18.772 mi. S.P. 859-F, Parker Co., to J. Lee & E. A. Vilbig, 2517 Eakin St., Dallas, $80,241 est. $160,000—caliche and crusher run broken stone base course surfacing 9.784 mi. S.P. 789-A and D, Karnes Co., to R. B. Smith, Inc., Dallas, $56,295 est. $78,000—2 course water bound caliche base course surfacing 18.881 mi. S.P. 925-C, Hansford Co., to Womack, Henning Constr. Co., Sherman, $77,916 est. $120,000—grading, drainage structures 0.754 mi. S.P. 854-G, Childress Co., to O. Speer, Alvord, $17,870 est. $25,000—11.525 mi. S.P. 125, Reopened and 889 E, Brazoria Co., to A. J. Harborn, Grand Prairie, $48,574 est. $60,000. Grand total $581,014.

Utah—State Rd. Comm., Salt Lake City, grading, bridging, surfacing 6.5 mi. Arrowhead Trail, Iron Co., to Clyde & Whiting, Springville, $30,648. Est. $40,000.

Washington—S. J. Humes, dir. Hys., Olympia, grading, crushed stone surfacing 9.3 mi. Pend Oreille Co., to N. A. Degerstrom, Peyton Bldg., Spokane, $85,265—35,430 cu.yd. in Grant Co., to Joslin & McAllister, Spokane, $28,063—5,100 cu.yd. Clallam Co., to F. G. Robinson, Yakima, $6,436—concrete paving 0.9 mi. Pacific Hy., in Tacoma, to J. Werder, Sr., Tacoma, $46,513—5 bridges and 1 box culvert, King and Pierce Counties, to J. F. Telander, Spokane, $34,436. Grand total $200,713. Noted Oct. 1.

Wash., Yakima—Paving Summit View Ave., to Midstate Constr. Co., Yakima, $33,751. Est. $36,500. Noted Oct. 13.

West Virginia—State Roads Comm., Charleston, grading, drainage structures, concrete surfacing 0.62 mi. Fairmont City-Ices Run Rd., Part Project 2138 Marion Co., to R. W. Fimple, Fairmont, $20,944.

W. Va., Spencer — State Road Comm. and Roane Co. Court, grading, drainage structures 2.6 mi. Newton-Clay Co. Line Rd., Project 3416-D, to J. M. Cain & Co., Huntington, $43,627. Noted Sept. 3.

Wisconsin—State Hy. Comm., Madison, grading, concrete paving 8,520 sq.yd. South County Line-Kaukauna Rd., Outagamie Co., to R. McCarty, Kaukauna, $17,741—grading 0.747 mi. LaCrosse-LaCrescent Rd., LaCrosse Co., to LaCrosse Dredging Co., 405 Plymouth Bldg., Minneapolis, Minn., $32,298—constructing Leighton Bridge, to Chicago Constr. Co., Oconto, $14,614. Grand total $64,653. Noted Oct. 8.

Wyoming—State Hy. Comm., Capitol Bldg., Cheyenne, grading, constructing 11 timber bridges in Carbon Co. and crushed gravel surfacing 18.45 mi. Natrona Co., to T. J. Tobin Constr. Co., Casper, $35,112 and $34,438 respectively—42 x 124 ft. shop building at Kemmerer, Lincoln Co., to Green River Lumber Co., Green River, $18,980—30 x 80 ft. shop building at Laramie, Albany Co., to Wyoming Constr. Co., Laramie, $5,300. Grand total $93,830. Noted Oct. 8.

B. C., Vancouver—Sidewalks, to E. A. Anderson, 306 East 20th Ave., $18,572—concrete paving, to Vancouver Pile Driving & Contg. Co. Ltd., 207 West Hastings St., $87,787.

Ont., Peterborough — Grading, concrete base paving, by day labor; bitulithic surfacing 11,500 sq.yd. to Warren Bituminous Paving Co., 74 University Ave., Toronto, at $1.72 per sq.yd. Est. $40,000. R. H. Parsons, City Offices, engr.

Ont., Sault Ste. Marie— See "Sewers."

Ont., Swansea—Village, grading, asphalt on concrete paving Kingsway extension from Bloor to Queen St., to Godson Contg. Co. Ltd., 203 Richmond St. W., Toronto, $71,330.

Ont., Toronto—City, asphalt paving Sects. A and B Keating St., to McNamara Constr. Co., 53 Yonge St., $31,187 and $20,508 respectively—Corley Ave., to Kiker & Earle Ltd., Harbor Bldg., $2,305. Grand total $64,000.

Ont., Toronto—York Twp., grading, bitulithic on concrete paving, concrete curbing, guttering Eglinton Ave., to Warren Bituminous Paving Co., 74 University Ave., $55,800.

EXCAVATION, DRAINAGE, IRRIGATION, LEVEES, RIVER AND HARBOR

PROPOSED WORK

Ariz., Florence—Randolph Irrigation Dist. soon takes bids on 24 pumping units, weller 132,000 lin.ft. gunite lined canals and laterals, 70 turnout structures, 35 culverts, $2,000,000. Scott Eng. Co., Phoenix, engr. Noted Oct. 8.

Calif., Long Beach—Breaking towing bayou in Recreation Park for 60-boat capacity, $40,000. A. H. Adams, city engr.

Ia., Sioux City—City, con. E. V. Moore, clk., relocating Perry Creek channel for flood control, $2,000,000. L. Hansen, City Hall, engr.

N. J., Belmar—Iron bulkheading, dredging and fill Shark River Park Front Park, $150,000.

BIDS ASKED

Ala., Mobile—Seawall Comm., H. D. Shaw, engr., bids about Jan. 1, 10 mi. seawall.

Calif., Ventura—Nov. 3, by L. E. Hallowell, clk., Ventura Co., excavating 214,200 cu.yd. channel in Santa Clara River bed for protection Red Mountain Rd.

Calif., Ventura—Nov. 3, by L. E. Hallowell, clk., Ventura Co., 2,800 cu.yd. excav., 30,000 sq.ft. concrete lining in connection with storm water ditch in Telegraph Rd.

O., Toledo—Nov. 2, by Bd. Comrs., Lucas Co., Court House, A. E. Schmidt, clk., diverting waters of and straightening Swan Creek in Waterville Twp.; cleaning channel Swan Creek, diverting waters of and straightening County Ditch 403, both Swanton Twp.

Wash., Bellingham—City Council bids about Nov. 17, replacing with-steel bill Chuckanut and 21th St. Bridges, $75,000. J. C. Hill, city engr.

Quebec—Nov. 3, by N. Desjardins secy. Dpt. P. Wks., Ottawa, Ont., shore protection wall in Shawinigan Bay, St. Maurice Co. $68,000.

CONTRACTS AWARDED

Calif., Newport Beach—Irvine Co., 1,700,000 cu.yd. dredging in connection with tideland property near state highway, Orange Co., to Sparkes & McClellan, Newport Beach, $236,750.

Ill., Quincy—Indian Grave Drainage Dist., F. Worley, pres., enlarging old levees, Sects. 1, 3, 5 and 6, incl. 491,788 cu.yd., to Matthews Bros. Constr. Co., Erie, $58,248. Sect. 2, incl. 264,964 cu.yd. excav., to Wapello Constr. Co., Wapello, Ia., $47,693. Sect. 4, incl. 200,248 cu.yd., to C. Miller, Keokuk, Ia., $29,536. Grand total $135,477. Est. $138,000. Noted Dec. 25.

Ind., Martinsville—Morgan Co., Robert Bayles Ditch, to Nelson J. Cole & Son, Martinsville. Est. $25,000.

Mass., Brookline — Town, Bd. Selectmen, channel for Saw Mill Brook, to L. Balboni, 78 Metropolitan Ave., Hyde Park, $26,375.

Minn., Fairmont—W. M. Canfield, and Martin Co., Judicial Ditch 115, bulkhead and spillway, to D. Christensen, Cedar Rapids, Ia., $7,757; concrete tile, to Wilson Constr. Co., Humboldt, Ia., $16,839.

Tex., Waco—W. C. Cobb, and McLennan Co., 3.69 mi. drainage channel, to S. P. Babcock, Waco, $19,828. Noted Oct. 1.

Bond Elections

Coming Bond Elections

Waterworks—Brea, Calif., $20,000. G. L. May, Clk.

Dams, Pumping Plants, etc.—San Jose, Calif., Santa Clara Water Conservation Dist., Nov. 17, $6,000,000.

Waterworks Impvts. — Ludlow, Ky., Nov. 3, $120,000.

Waterworks—Watertown, S. D., Nov. 3, $200,000.

Sewage Disposal Plant—Norwalk, O., Nov. 3, $200,000.

Sewers and Sewage Treatment—Van Wert, O., Nov. 3, $500,000. Jennings-Lawrence Co., 750 East State St., Columbus, engr.

Bonds Voted

Watermains, Pumping Equipment — Guthrie Center, Iowa, $35,000. W. E. Buell & Co., Sioux City, engr.

Waterworks Impvts.—Elbridge, N. Y., $55,000.

Bridges — The Dalles, Wasco County, Ore., $600,000.

High School—Hawthorne, N. J., $475,000.

Bonds Defeated

Water Purification Plant—Pryor, Okla., $75,000.

Electric Light Plant—Pryor, Okla., $75,000.

Schools—Cliffside Park, N. J., $550,000.

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FEDERAL GOVERNMENT

PROPOSED WORK

Conn., Groton—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office.

Del., Dover—POST OFFICE—Treas. Dpt. at office Sup. Archt., plans by Massena & duPont, 921 Market St., Wilmington, U. S. Post Office.

Ga., Brunswick—DREDGING—U. S. Eng., Savannah, improving Brunswick Harbor. $20,000 allotted.

Ind., Hagerstown — POST OFFICE — Treas. Dpt. at office Sup. Archt., U. S. Post Office, $80,000.

N. Y., Potsdam—POST OFFICE—Treas. Dpt. at office Sup. Archt., rejected bids Aug. 21. U. S. Post Office. Will readvertise. Noted Aug. 6.

N. Y., Trout River—INSPECTION STATION —Nov. 3, by Treas. Dpt. at office Sup. Archt., U. S. Inspection Station.

North Carolina—DREDGING—U. S. Eng., Wilmington, 67,680 cu.yd. Sect. 11 and 88,700 cu.yd. in Sects. 1 and 11, Intracoastal Waterway from Beaufort to Cape Fear.

Tex., McAllen—POST OFFICE—Treas. Dpt. at office Sup. Archt., bids about January 1 or 2 story post office, $150,000. J. D. Porter, Federal Bldg., Dallas, archt. Noted Feb. 26.

Texas—DREDGING—U. S. Eng., Galveston, bids early in December, 10,000,000 cu.yd. eastern end Galveston-Port Arthur Sect., Intracoastal Canal. $400,000.

BIDS ASKED

Ala., Montgomery—QUARTERS—Nov. 16, by Con. Q. M., 21 company officers quarters at Maxwell Field; adv. E.N.-R. Oct. 29. Noted Oct. 8.

California — ROAD — Nov. 5, by C. H. Sweetser, dist. engr. Pub. Rds., San Francisco, crushed rock paving 7.226 mi. Sect. B-2, Route 2, Wawona Rd., Mariposa Co.

Calif., Alameda—SEWERS, PIPE, etc.—Nov. 10, by C. H. Sweetser, dist. engr. Pub. Rds., 461 Market St., San Francisco, 116 ft. rein.-con. and 5,412 ft. vitr. ironstone sewer pipe, 17 brick manholes, 32 brick catchbasins, 1,440 ft. found. piles, 1 timber bulkhead, 1,530 cu.yd. unclassified excav. for outfall sewer ditch, 1,187 ft. multiple duct subways, 4 rein.-con. manholes, 7 rein.-con. service boxes, at Government Island. Noted July 9.

Calif., San Diego—ACID TANK—Nov. 5, by Pub. Wks. Officer, 11th Naval Dist., 15,000 gal. lead-lined steel acid tank, with piping, valves, founds.

Calif., Sawtelle—HOSPITAL—Nov. 20, by Vet. Bu., Arlington Bldg., addition to Wadsworth Hospital, Veterans Administration Home, $550,000. L. H. Tripp, Palo Alto.

D. C., Wash.—GRADING, etc.—Nov. 4, by Con. Q. M., Bolling Field, grading, improving 132 acres for flying field.

Ia., Davenport—DAM—Dec. 18, by U. S. Eng., Rock Island, Ill., 9 ft. channel roller dam, sea wall, intercepting sewer. To exceed $3,000,000; adv. E.N.-R. Oct. 29.

Kan., Atchison—DIKES—Nov. 16, by U. S. Eng., Kansas City, Mo., 12,105 lin.ft. standard pile clump dikes, in Missouri River, at Rushville Bend, center of work being 5 mi. upstream from here.

Kan., Kansas City—DIKES—Nov. 16, by U. S. Eng., 700 Postal Telegraph Bldg., 8,010 lin.ft. standard pile clump dikes and 3,000 lin.ft. standard revetment in Missouri River at Quindaro Haw and Kansas River Bends, center of work being 3 mi. upstream from here.

Mass., Watertown—POWER PLANTS—Nov. 28, by U. S. Eng., Watertown, Mass. Arsenal, 13 gasoline electric power plants, Circular 52.

Minn., Minneapolis—FOUNDATIONS, etc.—Nov. 9, by Treas. Dpt. at office Sup. Archt., demolition, founds. for U. S. Post Office; adv. E.N.-R. Oct. 29.

Mo., Arrow Rock—CLUMP DIKES—Nov. 18, by U. S. Eng., 707 Postal Telegraph Bldg., Kansas City, 1,750 lin.ft. standard pile clump dikes at Nigger Bend, 0.25 mi. downstream from here.

Mo., Boonville—CLUMP DIKES—Nov. 19, by U. S. Eng., 707 Postal Telegraph Bldg., Kansas City, 6,800 lin.ft. standard pile clump dikes in Missouri River, at Robinson Bend, center of work being 11.7 mi. upstream from here.

Mo., Chamois—DIKES—Nov. 14, by U. S. Eng., 700 Postal Telegraph Bldg., Kansas City, 10,000 lin.ft standard pile clump dikes in Missouri River, at Portland Reach, center of work being 5.5 mi. downstream from here.

Mo., Glasgow—CLUMP DIKES—Nov. 20, by U. S. Eng., 707 Postal Telegraph Bldg., Kansas City, 3,020 lin.ft. standard pile clump dikes in Missouri River at Bluffport Reach, center of work being 2.5 mi. downstream from here.

Mo., Springfield—HOSPITAL—Nov. 12, by Treas. Dpt. at office Sup. Archt., main building, acute building, continued treatment building, mess halls, kitchen and auditorium building, storehouse and bakery building, laundry, boiler house, medical building, connecting passages and tunnels, meter house, near Sunshine Rd., also pipe tunnel to tuberculosis building, for hospital, for defective delinquents, for Dpt. Justice; adv. E.N.-R. Oct. 29. Noted Sept. 17.

Neb., Broken Bow—POST OFFICE—Nov. 10, by Treas. Dpt. at office Superv. Archt., U. S. Post Office; adv. E.N.-R. Oct. 29. Noted Aug. 6.

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Ore., Portland—COURT HOUSE—Nov. 30, by Treas. Dpt. at office Sup. Archt., U. S. Court House; adv. E.N.-R. Oct. 29.

R. I., Newport—SAND BLASTING EQUIPMENT—Nov. 3, by Bureau Supplies, Navy Dpt., sand blasting and dust collecting equipment, Schedule 6789.

Va., Langley Field—QUARTERS—Nov. 16, by Con Q. M. 6 single and 4 double company officers' quarters; adv. E.N.-R. Oct. 29.

Wis., Alma—LOCK—Nov. 17, by U. S. Eng., 615 Commerce Bldg., St. Paul, Minn., main lock and portion auxiliary lock and dam in Mississippi River, near here; adv. E.N.-R. Oct. 29. Noted Oct. 8.

Wyo., Thermopolis—POST OFFICE—Nov. 20, by Treas. Dpt. at office Sup. Archt., U. S. Post Office; adv. E.N.-R. Oct. 29. Noted Jan. 15.

CONTRACTS AWARDED

Ala., Fort McClellan—GARAGE—Con. Q. M., 102 x 138 ft., tile, stucco garage, to Norwood Griffin Co., Atlanta, Ga., $24,200. Noted Sept. 24.

Ala., Greenville—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office, to D. T. Underwood, Pioneer Bldg., Birmingham, $52,995. Noted Sept. 24.

Arizona—ROAD—Pub. Rds., Park Dpt., Grand Canyon, bituminous treated crushed rock or graveling 17.1 mi. South Approach Rd., Grand Canyon Natl. Park, Tusayan Natl. Park, Coconino Co., to G. H. Oswald, Los Angeles, Calif., $96,600. Est. $102,875. Noted Sept. 17.

Ariz., Tucson—HANGAR—Con. Q. M., 8th Corp. Area, Fort Sam Houston, Tex., 1 air corps utilities hangar with 2 annexes, 110 x 220 ft., to R. McKee, 1918 Texas St., El Paso, Tex., $34,850. Est. $40,000. Noted Sept. 17.

Calif., Sunnyvale—HANGAR—Spec. 6631—Yards & Docks, Navy Dpt., found. and ground work for airship dock at Naval Air Station, to Raymond Concrete Pile Co., 140 Cedar St., New York, $181,181. Noted Oct. 8.

Idaho—ROAD—B. J. Finch, dist. engr., Ogden, Utah, grading, draining 3.6 mi. North and South Hy., in Pend Oreille Natl. Forest, Boundary Co., to Triangle Constr. Co., 1220 Ide St., Spokane, Wash., $24,345. Est. $35,178. Noted Oct. 8 Daily.

Ill., Highland—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office, to J. I. Barnes, Logansport, Ind., $52,000. Noted Oct. 1.

Ky., Central City—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office, to A. F. Perry, Bisbee Bldg., Jacksonville, Fla., $50,845. Noted Oct. 1.

Ky., Elizabethtown—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office, to A. F. Perry, Jr., Bisbee Bldg., Jacksonville, Fla., $42,860. Noted Oct. 1.

Ky., Paintsville—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office, to B. E. Wood, Bluefield, W. Va., $54,000. Noted Oct. 1.

Louisiana—DREDGING—U. S. Eng., New Orleans, to Trimityfarm Constr. Co., Santa Fe Bldg., Dallas, Tex., 550,000 cu.yd. Item S 11, Alexandria New Levee, Red River Atchafalaya and Bayou Boeuf Levee Dist., $50,930; to J. J. McKeithen, Grayson, 108,000 cu.yd. Sample-Wesdale New Levee, Red River-Bayou Pierre Levee Dist. and Drainage Dist. Red River Parish at $0.847 per cu.yd.; to C. I. Jones, Baton Rouge, 720,000 cu.yd. Item R 828, Solitude-Chamberlain Levee Enlargement, $91,296; to J. H. Boyce & Sons Co. and R. L. Igo, Memphis, Tenn., 545,000 cu.yd. Item R 842 C, Fort Allen-Brusley Levee, 610,000 cu.yd. same levee, and 545,000 cu.yd. Item R 842 B same levee, all foregoing at $0.0965 per cu.yd.—to Brooks-Callaway Co., McGlawn-Bown Bldg., Atlanta, Ga., 760,000 cu.yd. Item R 848 A, Missouri-Bend Levee New and Enlargement, 770,000 cu.yd. Item R 848 B same levee, and 770,000 cu.yd. Item R 848 C same levee, at $0.12 per cu.yd.; to A. Ranieri, 33 North LaSalle St., Chicago, Ill., 740,000 cu.yd. Item R 831 A, Chamberlain-Lobdell Levee, 740,000 cu.yd. Item R 831 B, 730,000 cu.yd. Item 831 C, and 740,000 cu.yd. Item R 831 D, at $0.124 per cu.yd.; to J. J. McCaughey & States Contg. Co., 205 West Wacker Dr., Chicago, Ill., 650,000 cu.yd. Item R 822 B, Arbroth-Alford Levee, 650,000 cu.yd. Item R 822 A same levee, and 650,000 cu.yd. Item R 882 C, same levee, at $0.1488 per cu.yd., 800,000 cu.yd. Item R 814 B, Waterloo-Hermitage Levee, New and Enlargement, and 800,000 cu.yd. Item R 814 A same levee, at $0.1472 per cu.yd., 580,000 cu.yd. Item R 820, Kelson New Levee, $74,272, all foregoing in Atchafalaya Front Levee, Second New Orleans Levee Dist. Noted Sept. 10.

Louisiana—DREDGING—U. S. Eng., New Orleans, 585,000 cu.yd. St. Gabriel Levee new, Item L868B, 585,000 cu.yd. same levee, Item L868A, 580,000 cu.yd. same levee, Item 868C, for Pontchartrain Levee Dist., 2nd New Orleans Levee Dist., to Brooks-Callaway Co., McGlawn Brown Bldg., Atlanta, Ga., at $0.12 per cu.yd.

Tenn., Johnson City—HOSPITAL, etc.—Vet. Bu., Arlington Bldg., hospital addition and barracks, to H. B. Ryan Co., 500 North Dearborn St., Chicago, Ill., $210,000. Noted Sept. 3.

Wash., Colfax—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office, to Hedeen Constr. Co., Amer. Bank Bldg., Seattle, $70,480. Noted Aug. 20.

RAILWAYS

PROPOSED WORK

California—Southern Pacific R.R. Co., 65 Market St., San Francisco, G. W. Boschke, ch. engr., Atchison, Topeka & Santa Fe R.R. Co., 80 East Jackson Blvd., Chicago, Ill., G. W. Harris, ch. engr., Union Pacific R.R. Co., 1416 Dodge St., Omaha, Neb., H. G. Mann, ch. engr., passenger station at Plaza between Alisо and Macy Sts., at Los Angeles, $1,500,000-$2,000,000. Remainder of estimated cost of $10,000,000 will be for acquisition of land and track changes.

Missouri—See "Bridges, under St. Louis."

Texas—Del Rio & Northern Ry. Co., c/o T. N. Picnot, pres., Carrizzo Springs, granted charter and making surveys new railroad between Del Rio and Sonora and Del Rio to Quemado, $1,000,000. Private plans.

BIDS ASKED

Texas—See "Contracts Awarded."

CONTRACTS AWARDED

Texas—Southern Pacific Ry. Co., G. W. Boschke, ch. engr. System San Francisco, Calif., building and connecting up for new railway line between San Angelo and San Antonio, rail laying by own forces. Total est. $3,000,000. R. W. Barnes, Houston, Tex., ch. engr. lines in Texas and Louisiana.

SUBWAYS AND TUNNELS

BIDS ASKED

Pa., Phila.—Nov. 4, by Dpt. City Transit, C. E. Myers, dir., City Hall Annex, Contr. 333, installing 350 gross tons contact rail, furnishing, installing track bonding, Ridge Ave. and 8th St., West Phila. Branch Broad St. Subway.

GRADE CROSSINGS

PROPOSED WORK

Colo., Brush—State Hy. Dpt., Denver, C. D. Vail, ch. engr., and Chicago, Quincy & Burlington R.R. Co., 547 West Jackson Blvd., Chicago, Ill., A. W. Newton, ch. engr., underpass on Brush-Sterling Hy., near here. Above railroad will pay $200,000 towards cost.

Mo., St. Louis—See "Bridges."

Neb., Hastings—City and Chicago, Burlington & Quincy R.R. Co., A. W. Newton, ch. engr., 547 West Jackson Blvd., Chicago, Ill., rein.-con. underpass, $60,000.

N. Y., Hamburg—Erie R.R. Co., G. S. Fanning, ch. engr., 101 Prospect Ave., S. W., Cleveland, O., eliminating grade crossing 1 mi. north of Hamburg Station. $152,800.

N. Y., Rouses Point — Delaware & Hudson R.R. Co., J. MacMartin, ch. engr., Albany, eliminating Windsor Crossing, 1 mi. south of here. $128,100.

Ont., Toronto—City extending Bay St., consisting concrete, steel subway under Canadian Pacific R.R., Bay St., incl. concrete piers, retaining walls, abutments. $200,000. R. C. Harris, City Hall, engr.

BIDS ASKED

N. Y., Buffalo—Nov. 6, by New York Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave., New York, eliminating portion Amherst-Austin-Tonawanda St. Grade Crossing. $1,500,000.

Wisconsin—Oct. 29, by State Hy. and Unemployment Comms., State Capitol Annex, Madison, approaches for Darien Grade Separation (subway) Project 464-B, S.T.H. 89, Walworth Co., Eland Junction Overhead, S.A.P. 3456, S.T.H. 26, Shawano Co.; Roberts Overhead, S.A.P. 6187, S.T.H. 75, St. Croix Co.; East Forest Junction Overhead, S.A.P. 3404, U. S. Hy. 10, Calumet Co.

CONTRACTS AWARDED

Ind., Huntington—City and Chicago & Erie R.R. Co., 101 Prospect Ave., Cleveland, O., G. S. Fleming, ch. engr., Tipton Street Subway, to Fischer & Hyman, Logansport, $28,809. Est. $73,437. Noted Oct. 1.

Mo., St. Louis—See "Bridges."

Wisconsin — State Hy. and Unemployment Comms., Madison, constructing Mormon Coulee Overhead, LaCrosse Co., to Hoeppner-Bartlett, Eau Claire, $98,303; Bell Overhead, Walworth Co., and Silvernale Overhead, Waukesha Co., to Pocholski & Doligolski, Milwaukee, $34,875 and $29,698 respectively; Casco Overhead, Kewaunee Co., to C. R. Meyer & Sons, Oshkosh, $39,876; Kivlin Overhead, Dane Co., to Hanson-Beekman Co., Beloit, $14,343. Grand total $126,496.

DAMS

PROPOSED WORK

Pa., Bedford—See "Water Works."

PIERS AND WHARVES

PROPOSED WORK

Ont., Toronto — WHARF — Toronto Harbour Comrs., Harbour Bldg., completing wharf, foot of Parliament St. $155,000. J. G. Wainwright, Harbour Bldg., engr.

N. Y., New York—PIER—Nov. 4, by J. McKenzie, comr. Docks, Pier A, Battery Pl., building Pier 9, incl. dredging, depositing rip rap and filling, foot Old Slip, East River, Contr. 2042.

Piers and Wharves (Continued)

N. Y., New York—PIER, etc.—Nov. 5, by J. McKenzie, comr. Docks, Pier A, foot Battery Pl., constructing Pier New 45, incl. bulkhead wall, removing old piers, foot West 10th St. North River, Contr. 2008.

CONTRACTS AWARDED

Que., Father Point—WHARF—Dpt. P. Wks., Ottawa, Ont., repairing wharf and protection work, to Farley & Grant, Bank National Bldg., Rideau St., Ottawa, Ont., $24,500.

AIRPORTS

CONTRACTS AWARDED

N. Y., Brooklyn—J. McKenzie, comr. Docks, Pier A, Battery Pl., New York, rem. con. taxi strips and fillets Municipal Airport, Floyd Bennett Field, Contr. 2048, to T. McMillan Contg. Co., 49 South St., New York, $18,495. Noted Oct. 1.

GRAIN ELEVATORS

CONTRACTS AWARDED

N. Y., Albany — GRAIN ELEVATOR — Albany Port Dist. Comn., 74 Chapel St., concrete elevator combining grain elevator features with warehouse space, on 8 acres waterfront lands, to James Stewart Corp., 343 South Dearborn St., Chicago, Ill., $1,497,235. Noted Oct. 8.

POWER AND LIGHTING

CONTRACTS AWARDED

Calif., San Jose — Ornamental street lighting system with underground system at 1st St., to Walker-Martin Corp., 4215 South Western Ave., Los Angeles, $25,050.

PARKS AND SPORTS

PROPOSED WORK

Calif., Long Beach—See "Excavation, Drainage, Irrigation, Levees, Rivers and Harbors."

Ill., Chicago—South Bd., E. J. Kelly, pres., soon takes bids group buildings, incl. gymnasium, auditorium, library, welfare, club rooms, L shaped outdoor swimming pool, bath house, constituting Community Center in Avalon Park, south of 83rd St. and facing Avalon Ave. $375,000. A. E. Alschuler, 28 East Jackson Blvd., archt.

Mass., Taunton — City, J. P. Murphy, 2 Monica St., stadium at Hopewell Park, $40,000. E. K. Crowell, City Hall, engr.

N. J., Camden —Camden Co. Park Comn., Court House, J. T. Wallworth, pres., 1 and 2 story, 54 x 183 ft. bath house, Philip St. and Ferry Ave. J. H. Hettel, 544 Federal Bldg., archt.

N. Y., Brooklyn—Dpt. Parks, W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, New York, stadium, 100,000 or more seating capacity, Marine Park, $3,000,000. C. D. Lay, 101 Park Ave., New York, landscape archt.

Tex., San Antonio—City, c/o C. M. Chambers, mayor, park improvements, $450,000. I. Ewig, city engr.

CONTRACTS AWARDED

Mass., Boston—See "Streets and Roads."

N. Y., Buffalo—City, W. A. Rathman, Municipal Bldg., landscape work for developing centennial park, foot Georgia St., to H. R. Hankin & Son, 96 Gillette St., Buffalo, $36,783. Est. $50,000.

Pa., Ligonier—Idlewild Management Co., C. C. Macdonald, pres., Rock Springs Park, Chester, W. Va., 100 x 100 ft. concrete swimming pool, filtration plant, bath house, to D. F. Nellis & Sons Co., 648 St. Clair Ave., East Liverpool, O., $65,000.

HEATING AND VENTILATING

BIDS ASKED

N. Y., Auburn—Nov. 24, by Commissioner Correction, State Office Bldg., Albany, heating work, sanitary work, kitchen equipment, bakery oven, machinery, etc., at New Mess Hall, Kitchen and Bakery Building, Auburn Prison.

N. Y., Beacon—Dec. 3, by Commissioner Correction, State Office Bldg., Albany, heating, sanitary work, electrical work, at laundry and tailor shop building, staff house, Matteawan State Hospitals.

N. Y., Brockport—Nov. 12, by Commissioner Education, State Educ. Bldg., Albany, heating work, repairing, replacing, altering steam and return lines at New York State Normal School.

N. Y., Central Islip—Nov. 24, by Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, heating, sanitary work, equipment, kitchen equipment for dining room and kitchen building, James Group and Patients Reception Hospital, Building 7, Central Islip State Hospital.

N. Y., Iroquois—Nov. 19, by Superintendent Standards & Purchase, State Capitol, heating work, additional boiler with piping, equipment, at Thomas Indian School; adv. E.N.-R. Oct. 29.

N. Y., Middletown—Nov. 18, by Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, heating work, boiler, equipment, at Middletown State Homeopathic Hospital; adv. E.N.-R. Oct. 29.

N. Y., Napanoch—Nov. 17, by Commissioner Correction, State Office Bldg., Albany, heating, electrical work, service connections, Institute for Defective Delinquents; adv. E.N.-R. Oct. 29.

N. Y., Wassaic—Nov. 24, by Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, heating, sanitary and equipment, kitchen equipment kitchen and dining hall, Building 16M, Wassaic State School.

CONTRACTS AWARDED

Mass., Worcester—City, Worcester Memorial Auditorium, heating memorial auditorium to Tucker & Rice, Inc., 165 Commercial St., $124,439; plumbing, to McMahon & Murphy, 156 Institute Rd., $30,079; electrical work, to Scrimgeour Electric Co., 201 Commercial St., $142,873. Grand total $303,382. Noted June 25, under "Public."

N. Y., Pine Aire Station—Dpt. Mental Hygiene, State Office Bldg., Albany, heating work in Buildings 18, 19, 20, 36, 42, 43, 54, 58, 59, 60, 61, 69, 70, 71, 72, to Ruisler Heating Co., 129 Amsterdam Ave., New York, $430,000. Noted July 30, under "Hospitals."

UNCLASSIFIED

PROPOSED WORK

California—OIL PIPE LINE—Standard Oil Co., 605 West 10th St., Los Angeles, pipe line from Kettleman Hills to Estero Bay (Marine Terminal), $500,000. **Maturity at once.**

Colo., Canon City—AERIAL CABLEWAY—Royal Gorge Bridge & Amusement Co., c/o L. P. Piper or W. W. Thorp, Canon City, 1,260 ft. aerial cableway to serve 22 passenger car across Royal Gorge near here. G. D. Cole, Houston, Tex., probable engineer.

Kan., Chanute—GAS PIPE LINE and STATION—Kansas Communities Gas Co., W. E. Murphy, secy-treas. and genl mgr., preliminary plans 12 mi. pipe line and compressor station, $100,000.

Mass., Quincy—OIL STATION—Quincy Oil Co., 58 Federal Ave., bulk oil station, incl. office building, garage, warehouse, storage tanks for 26,250 gal., Federal Ave. $500,000. G. E. St. Laurent, c/o Owner, engr. Noted Feb. 26.

Mass., Quincy—OIL TANK TERMINAL, etc.—New England Terminal Co., M. P. Sheahan, 45 Bates Ave., oil tank terminal on Quincy side of Neponset River, incl. 32 storage tanks, garage, office building, pump house, wharf, sidings, $2,000,000. Private plans.

Montana, Wyoming, Idaho and Oregon — PIPE LINES—International Utilities Corp., D. E. Lamb, representative Portland, Ore., applied for permit to construct 20 in. natural gas pipe line from Montana, Wyoming, Idaho gas fields to Portland, Ore. $10,000,000.

N. Y., Pocantico Hills—STABLES—J. D. Rockefeller, Jr., 26 Bway., New York, bids about December, stables and silo, $150,000. Grosvenor Atterbury, 139 East 43rd St., New York, archt. Noted Oct. 22.

BIDS ASKED

N. Y., Albion—REFRIGERATION WORK—Nov. 17, by Commissioner Correction, State Office Bldg., Albany, refrigeration work, industrial building, storehouse, Institution for Mental Defective Women; adv. E.N.-R. Oct. 29.

N. Y., Dannemora — REFRIGERATION WORK—Nov. 24, by Commissioner Correction, State Office Bldg., Albany, tuberculosis hospital, Clinton Prison; adv. E.N.-R. Oct. 29.

N. Y., Geneva—GREENHOUSE—Nov. 24, by Commissioner Education, Education Bldg., Albany, greenhouse at New York State Agricultural Experiment Station.

N. Y., Ogdensburg — REFRIGERATION WORK—Nov. 24, by Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, refrigeration work, St. Lawrence State Hospital; adv. E.N.-R. Oct. 29.

N. Y., St. George—ASPHALT PLANT—Nov. 4, by J. A. Lynch, pres. Richmond Boro. Boro Hall, building to enclose asphalt plant with extra concrete founds., piling for plant equipment.

N. Y., Thiells—REFRIGERATION WORK, etc.—Nov. 18, by Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, refrigeration work, morgue and equipment, hospital and refrigerating equipment, storehouse, hoods over kettles in service building, Letchworth Village.

Utah, Salt Lake City—RADIO STATION—See "Contracts Awarded."

CONTRACTS AWARDED

N. Y., Attica—REFRIGERATION WORK—Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, refrigeration work, storehouse and maintenance building at Attica State Prison, to Carbondale Mchy. Co., 642 Ellicott St., Buffalo, $43,936. Noted Sept. 24.

Texas—PIPE LINE—Texas Pipe Line Co., San Antonio, and Texas Co. Bldg., Houston, 13 mi 8 in. c.i. pipe line between Dayton and Barbers Hill, Chambers Co. $60,000. Owner builds.

Utah, Salt Lake City—RADIO STATION—K. S. L. Radio Broadcasting Station, 35 Richards St., enlarging radio station to 50,000 watts, day labor. $250,000.

MATERIALS

PROPOSED WORK

CAST IRON PIPE—**Hartley, Ia.**—City soon takes bids purchasing 12,000 ft. 4 and 6 in. c.i. pipe. Will install same with local labor.

BIDS ASKED

CONCRETE PIPE—**Corona, Calif.**—Nov. 3 by H. H. Hinckley, city clk., 4,082 ft. 6 to 24-in. concrete pipe not less than 400 lb. pressure per sq.in. Call sections to be 3 ft. in length.

PIPE—**Fair Oaks, Calif.**—Nov. 7, by G. L. Camden, secy. Fair Oaks Irrigation Dist., 2,800 ft. 30-in. 10-gage riveted or welded steel slip joint soil proofed pipe, 1,500 ft. 12-in. 12-gage welded or riveted slip joint soil proofed pipe.

CABLE—**Los Angeles, Calif.**—Nov. 6, by T. Coughlin, city purch. agt., 1,820 ft. paper-insulated C.M. modified sector three conductor, 15,000 volt paper insulated oil impregnated lead covered cable.

STEEL RAILS and TRACK FASTENINGS.—**Chicago, Ill.**—Atchison, Topeka & Santa Fe R.R. Co., 80 East Jackson Blvd., G. W. Hartsfield, engr. system, in market 40,000 tons steel rails and 12,000 tons track fastenings.

SNOW FENCE, etc.—**Council Bluffs, Ia.**—Nov. 3, at office Auditor, Pottawattamie Co., 600,000 lin.ft. snow fence, 6,000 steel snow fence posts. Address County Engineer or Auditor.

BRIDGE LUMBER—**Creston, Ia.**—Nov. 10, at office Auditor Union Co., 220,000 ft. B.M. untreated and 70,000 ft. B.M. creosoted bridge lumber, 4,500 ft. creosoted piling. Address County Engineer or Auditor.

HAND RAIL LUMBER—**Hampton, Ia.**—Nov. 3, at office Auditor Franklin Co., 67,524 ft. B.M. untreated Class D lumber and 24,464 ft. B.M. Class C handrail lumber. Address County Engineer or Auditor.

STEEL—**Trenton, N. J.**—Nov. 12, by F. J. Quigley, state purch. agt., auto tag steel and auto license tag coating materials.

STRUCTURAL STEEL—**Phila., Pa.**—Nov. 5, by C. E. Walsh, city purch. agt. Pennsylvania R.R. Co., 15 North 32nd St., Contr. 18,1931, steel pipe; Contr. 29, 1931, structural steel.

LUMBER—**Bay City, Tex.**—Nov. 10, by Commissioners Court Matagorda Co., furnishing lumber as follows: 1 x 4, 1 x 6, 1 x 10, and 1 x 12; 2 x 4, 2 x 6, 2 x 8, 2 x 10, and 2 x 12; 3 x 6, 3 x 12, 3 x 8, 4 x 4, 4 x 6, 6 x 6, 6 x 8, 8 x 8, 10 x 10 and 12 x 12, 10 to 20 ft. lengths, delivered at any railroad station in county.

STONE, GRAVEL, etc.—**Virginia**—Nov. 4, by H. G. Shirley, engr. State Hy. Dpt. Richmond, 205,0000 tons slag, crushed stone, washed gravel for maintenance work, $500,000.

CAST IRON and LEAD PIPE, etc.—**Toronto, Ont.**—Nov. 3, by W. J. Stewart, mayor, City Hall, c.i. and lead pipe, sewer brick, mineral dust, portland cement, crushed rock, sand, crushed stone, gravel, screened and unscreened, rubble stone, house numbers, refined asphalt, granite setts, vit. paving blocks, pig lead and sulphur chloride. $150,0000 or more. R. C. Harris, City Hall, engr.

CONTRACTS AWARDED

CAST IRON PIPE—**Anaheim, Calif.**—E. B. Merritt, city clk., to American Cast Iron Pipe Co., 412 West 6th St., Los Angeles, 4,800 ft. 4 in. c.i. water pipe Class B or equal, at $0.308 per ft.; 3,000 ft. 6 in., $0.435; 1,600 ft. 8 in., $0.614; quantity 10 in., $0.826. Noted Sept. 17.

STEEL BARS—**Los Angeles, Calif.**—Los Angeles Co. Flood Control Dist., 202 North Bway., 370,000 lb. reinforcing steel bars for use in manufacturing precast concrete blocks for Los Angeles River protection work from Dayton Ave. to Fletcher Dr., to Concrete Eng. Co., 1450 Mirasol St., $17,004.

WATER PIPE—**Los Angeles, Calif.**—City Council, 1,260 ft. clay lengthless 30 in. diam. welded steel water pipe, to Consolidated Steel Corp., 1,200 North Main St., at $5.55 per ft.

CAST IRON PIPE—**Oakland, Calif.**—J. H. Kimball, secy. East Bay Municipal Utility Dist., 12,500 ft. 8 in., 45,000 ft. 6 in., and 34,000 ft. 4 in. c.i. pipe, to National Cast Iron Pipe Co., 571 Mission St., San Francisco, $40,920; 10,500 ft. 8 in. and 20,000 ft. 4 in. c.i. pipe, to Pacific States Cast Iron Pipe Co., 111 Sutter St., San Francisco, $13,542. Noted Oct. 8.

PIPE, SPECIAL CASTINGS, etc.—**Toronto, Ont.**—City, four 30 in. gate valves and special castings for 30 in. watermains, to Dominion Wheel & Foundries, Eastern Ave., at $803.90 each and $2,889 respectively; ninety-two lengths 20 in. and one hundred eighty-three lengths 30 in. c.i. pipe, to National Iron Corp., foot of Cherry St., at $64.20 and $103.20 per length respectively.

EQUIPMENT

PROPOSED WORK

GRADER — **Madera, Calif.** — Bd. Supervs. Madera Co. purchasing 12 ft. blade caterpillar grader, weight not less than 10,385 lb. L. W. Cooper, Co. clk.

BRICK MANUFACTURING MACHINE—**Bridgewater, Mass.**—Bridgewater Brick Co., installing new brick manufacturing machine.

BIDS ASKED

TRUCK—**Berkeley, Calif.**—Nov. 4, by F. E. Turner, city clk., 7,000 lb. motor driven garbage truck.

GATE VALVES, etc.—**Fresno, Calif.**—H. S. Foster, city clk., taking bids twenty-nine 4 in. and fifteen 6 in. gate valves with N.R.S. hub

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Equipment (Continued)

ends, solid wedge, for 150 lb. water pressure, also nineteen 8 in. and five 10 in. gate valve with NRS hub ends, double disc or 150 lb. water pressure.

INDUCTION REGULATORS—**Modesto, Calif.**—Nov. 9, by C. S. Abbott, secy., Modesto Irrigation Dist., furnishing, delivering 3 out-door type induction regulators.

VALVES, etc.—**San Francisco, Calif.**—Nov. 4, by Bd. P. Wks., S. J. Hester, secy., 2 automatic synchronous stop and relief valves, 1 automatic pressure valve, one 60 in. butterfly valve in connection with San Joaquin Valley Pipe Line, Hetch Hetchy Aqueduct.

TRACTOR—**Robertson, Mo.**—Nov. 3, by Bureal Supplies & Accounts, J. J. Cheatham, paymaster genl., Navy Dpt., industrial tractor.

SURFACER—**Trenton, N. J.**—Nov. 6, by State Purchase Comn., State House, 1 Oliver 261-A 30 in. surfacer.

ELEVATOR EQUIPMENT—**Pine Aire Station, N. Y.**—Nov. 18, by Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, electric elevator equipment, Pilgrim State Hospital.

DUMP TRUCK—**Forty Fort** (Wilkes-Barre, P. O.), **Pa.**—Nov. 2, by Boro Council, 1½ to 2 ton mechanical dump truck, 4,000 lb. capacity.

SNOW LOADER, etc.—**Scranton, Pa.**—Nov. 2, by Director P. Wks., snow loader, two 2½ ton and one 1½ ton steel box dump trucks; crawler type tractor with enclosed cab, street plates and engine hood having not less than 20 drawbar hp. and weigh 4 tons, equipped with hydraulic operated backfiller with reversible blade.

ROTARY SCRAPER—**Wichita Falls, Tex.**—Nov. 2, by Wichita Co., c/o P. Barnett, aud., one 7 or 8 ft. rotary scraper for Precinct 2.

CONTRACTS AWARDED

HEATING and POWER PLANT EQUIPMENT—**Cedar Falls, Ia.**—Iowa State Bd. Educ., State Capitol, Des Moines, W. H. Gemmill, secy., new heating and power plant equipment for State Teachers College, on campus, to Tapager Constr. Co., Albert Lea, Minn., $50,000.

FOREIGN

New Zealand, Wellington—Nov. 3, by Secretary Stores Div., General Post Office, 4,000 automatic dials.

Australia, Melbourne—Jan. 4, by Chairman State Electricity Comn., Victoria, paper and varnished cambric insulated lead covered wire armoured cable.

New Zealand, Wellington—Feb. 2, by Secretary P. Wks., Supply & Tenders Com., 11,000 v. switchgear, incl. 2 "on load" bus selector incoming transformer panels, one reactor panel, 1 bus bar potential transformer panel, 2 bus sectionalizing panels, 1 reactor panel, 2 "on load" bus selector incoming transformer panels, 1 synchronous condenser panel, 1 summation metering panel and 6 feeder panels also for spares and loose parts for Lake Coleridge Power Scheme.

Commercial Buildings

RESIDENTIAL

BIDS ASKED

Mass., Roxbury (sta. Boston)—See "Contracts Awarded."

N. J., Lyndhurst—See "Contracts Awarded."

N. Y., Auburndale—See "Contracts Awarded."

N. Y., Brooklyn—See "Contracts Awarded."

N. Y., New York—See "Contracts Awarded."

CONTRACTS AWARDED

Mass., Roxbury (sta. Boston)—H. Shullman, 62 Chambers St., Boston, 4 story, basement, brick, plain found., 109 Walnut St., day labor, $150,000. Winebaum & Wexler, 73 Cornhill, Boston, archts.

Mo., University City—W. A. Riley, 6221 Olive St., St. Louis, six 2 story, basement, 45 x 75 ft. buildings, Delmar Blvd. at Warder Ave., to W. A. Riley Constr. Co., 6221 Olive St., St. Louis. Est. $200,000.

N. J., Lyndhurst—J. Van Eyck, 374 Forest Ave., 4 story, basement, brick, steel, Weart St., separate contracts, $150,000. L. Vivoli, 593 Palisade Ave., Grantwood, archts.

N. Y., Auburndale—Auburndale Heights Inc., 110-18 Jamaica Ave., Jamaica, group 2 story residential buildings, 188th St. and 48th Ave., separate contracts, $900,000. A. Allen, 163-18 Jamaica Ave., Jamaica, archt.

N. Y., Brooklyn—Boom Building Corp., 703 Essex St., 4 story, basement, brick, East 93rd St. and Linden Blvd., separate contracts, $150,000. Kavy & Kavovitt, 350 Stone Ave., archts.

N. Y., Brooklyn—Corporation, c/o H. Goldberg, 1895 East 8th St., 6 story, basement, Nathan and Ocean View Aves., separate contracts, $200,000. J. J. Millman, 67 Court St., archt.

N. Y., Brooklyn—Fishkind Homes Corp., 1415 16th St., 6 story, 90 x 100 ft., Bay Ridge Parkway and 21st Ave., separate contracts, $165,000. Malkind & Weinstein, 93 Court St., archts.

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N. Y., Brooklyn—H. Koeppel, 101 Lawrence St., apartent, Newkirk and Coney Island Aves., separate contracts, $155,000. Malkind & Weinstein, 93 Court St., archts.

N. Y., Brooklyn—Neweb Realty Corp. 1609 South 2nd St., 6 story, 150 x 208 ft., Ocean Parkway, Webster and Newkirk Ave., separate contracts, $410,000. Malkind & Weinstein, 93 Court St., archts.

N. Y., Brooklyn—Paul Place Corp., c/o I. Barba, 16 Court St., 6 story, 132 x 145 ft., St. Paul's Court and St. Paul's Pl., separate contracts, $375,000. M. N. Weinstein, 93 Court St., archt.

N. Y., New York—Absar Realty Corp., A. Weisman, pres., 1457 Boscobel Ave., 6 story, 189 x 346 ft., Fieldston Rd. and 254th St., separate contracts, $600,000. C. Kremborg, 2543 Marion Ave., archt.

N. Y., New York—A. Ancowitz, 1975 Lafontaine Ave., 6 story, 85 x 125 ft., 212th St. and De Kalb Ave., separate contracts, $250,000. Becker & Levy, 349 Est 149th St., archts.

N. Y., New York—H. S. and P. Gold, 1910 Arthur Ave., 6 story, 100 x 100 ft., Morris Ave. and 196th St., separate contracts, $200,000. G. W. Swiller, 4215 3rd Ave., archt.

N. Y., New York—Olinville Gardens, Inc., B. Goss, pres., 1910 Arthur Ave., 6 story, 84 x 170 ft., Olinville and Waring Aves., separate contracts, $275,000. C. S. Clark, 441 East Tremont Ave., archt.

N. Y., New York—Randall Constr. Corp., J. Gettman, pres., 1910 Arthur Ave., 6 story, 84 x 163 ft., Tremont Ave. and Kingsland Pl., separate contracts, $180,000. G. W. Swiller, 4215 3rd Ave., archt.

N. Y., New York—Wolf Housing Corp., 730 East 241st St., 2 story, Wilder Ave. and Reimer St., separate contracts, $150,000. G. Prowler, 367 Fulton St., Brooklyn, archt.

CLUBS

PROPOSED WORK

Mass., Falmouth—Marine Lodge of Free & Accepted Masons, Woods Hole, soon lets contract 3 story, basement, 60 x 100 ft., brick, stone, club, plain found., Main St. $150,000. J. G. Hutchinson, 10 Norwell Rd., Dedham, archt.

Mass., Taunton—Masonic Building Corp., R. C. Witherell, pres., Masonic temple, $150,000. Architect not appointed.

Neb., Lincoln — Y.W.C.A., C. P. Peterson, chn. bd., soon lets contract 100 x 142 ft. concrete, brick, stone club, incl. swimming pool, $200,000. Megmuis & Schaumberg, 614 Federal Trust Bldg., archts. Noted Oct. 8.

N. J., Garfield—Club D, J. Conte, archt., 166 Harrison Ave., bids after Dec. 15, 2 story, basement, brick, steel club house, for Owner, c/o Architect. $150,000. Noted Aug. 20.

N. J., Ridgefield Park—Knights of Columbus, Bergen Ave., altering and constructing 3 story, basement, brick, steel club house addition, Bergen Ave., $150,000. **Maturity probably soon.**

Vt., Burlington—Burlington Odd Fellows Assn., C. G. McGaffney, 70 Grant St., plans by F. L. Austin, 240 College Ave., 3 or 4 story, basement, brick, steel addition, 150 Bank St. $150,000 or more funds being raised for same.

HOSPITALS

PROPOSED WORK

Ill., Jacksonville—Passavant Hospital Assn., H. J. Rodgers, pres., plans by Pond, Pond, Martin & Lloyd, 180 North Michigan Ave., Chicago, 4 story, basement hospital, State St. $300,000.

Mass., Fitchburg—Burbank Hospital, C. T. Crocker, chn. building com., isolation unit, Nichols St. $150,000 or more. Architect not appointed.

N. J., Coytesville—Allison Free Hospital, c/o L. H. Hoebel, mayor, Boro Hall, 3 story, brick, steel, Allison Estate. $150,000. **Maturity probably soon.** Architect not appointed.

N. Y., Brooklyn—Dpt. Hospitals, Municipal Bldg., New York, plans by C. N. Meyers, 31 Union Sq., New York, top addition Cumberland Hospital, Cumberland and Myrtle Aves. $300,000.

N. Y., Brooklyn—Dpt. Hospitals, Municipal Bldg., New York, plans by L. P. Ward, 205 East 42nd St., New York, top addition to doctor's residence, Clarkson Ave. and Albany St., for Kings Co. Hospital. $210,000.

Pa., Pittsburgh—University of Pittsburgh, J. C. Bowman, chn., plans by L. Stevens, Century Bldg., Psychiatric Hospital, Ohara and De Soto Sts. $2,000,000. Project financed by State.

BIDS ASKED

Ill., Manteno—State of Illinois, Capitol Bldg., Springfield, bids about Nov. 10, 2 story, basement hospital, $150,000. E. H. Clark, 8 East Huron St., Chicago, and State Div. Architects & Engineers, Capitol Bldg., Springfield, archts.

Mass., Peabody—City, J. B. Thomas Hospital, J. Sullivan, supt. in charge, taking bids altering and constructing 3 story, basement, brick, stone addition, plain found., King St. $150,000. J. M. Gray, 175 High St., Boston, archt. Noted Oct. 1.

N. Y., Brooklyn—Dec. 2, by Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, patients building, employees and staff accommodations, garage, power plant equipment and service conections, Brooklyn State Hospital.

N. Y., Central Islip—Nov. 24, by Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, assembly hall, Central Islip State Hospital.

N. Y., Creedmoor—Nov. 18, by Commissioner Mental Hygiene, State Office Bldg., Albany, Buildings 12, 19, 20, 21 and 22, altering existing buildings, service connections (tunnels) at Brooklyn State Hospital, Creedmoor Div.

N. Y., Poughkeepsie—Nov. 24, by Commissioner Mental Hygiene, State Office Bldg., Albany, 7 buildings, service connections, Hudson River State Hospital.

N. Y., Raybrook—Dec. 1, by Commissioner Health, at State Office Bldg., Albany, employees home addition, isolation cottage, garage, New York State Hospital, for Treatment Incipient Pulmonary Tuberculosis.

CONTRACTS AWARDED

N. J., Newark—Bd. City Comrs., City Hall, general contract 2 story, basement, 30 x 110 ft., brick, steel ward and recreation building addition, at Ivy Hill Almshouse, to Drill Contg. Co., 889 Broad St.; plumbing and heating, to J. F. Smith, 81 Monticello Ave.; electrical work, to Elmer D. Wilson, 54 Elizabeth Ave.; steel and iron, to Elizabeth Iron Wks., 127 Franklin St., Elizabeth. Est. $200,000. Noted Oct. 1.

N. Y., Long Island City—J. G. W. Greeff, comr. Dpt. Hospitals, Municipal Bldg., New York, general contract Building D, Queens General Hospital, to Camlou Building & Constr. Co., $136,256; plumbing, to J. E. Kahn, 224 West 20th St., New York, $14,978. Noted Oct. 1.

Que., Montreal—St. Lukes Hospital, hospital for contagious diseases, intersection Moreau and Sherbrooke Sts., to Collet Bros. Ltd., 1978 Parthenais St. Total est. $1,500,000. Noted Dec. 4.

CHURCHES

PROPOSED WORK

Ala., Montgomery—Court St. Methodist Congregation, J. W. Frazier, pastor, plans by G. Awsumb, Dermon Bldg., Memphis, Tenn., and soon takes bids 1 story, basement, 80 x 215 ft., church and 2 story, basement, 46 x 138 ft., Sunday school, both brick, concrete, stone, tile, Fairview Ave. and Norman Bridge Rd. $350,000.

Mass., New Bedford — Holy Name Roman Catholic Parish, J. M. Coffey, pastor, 765 County St., church. $150,000 or more. Architect not appointed.

Mo., St. Louis—St. Luke's Methodist Episcopal Congregation, B. M. Ridpath, pastor, 4996 Oleatha Ave., sketches by Struebig & Schmidt, 4996 Oleatha Ave., 1 and 2 story, basement, rick, rein.-con., stone, Hereford St. and Oleatha Ave. $125,000-$150,000.

SCHOOLS

PROPOSED WORK

Calif., San Francisco—Regents of University of California, Berkeley, plans by W. C. Hays, Crocker, 1st Natl. Bank Bldg., rein.-con., steel medical building, 2nd Ave. and Parnassus St. $600,000.

Conn., Bridgeport—City, Bd. Educ., soon takes bids, Junior High School, brick, steel, North End. $650,000. F. J. Dixon, State St., archt. Noted July 9.

Conn., Norwich—Norwich Free Academy, Executive Com., Crescent St., brick, steel school unit, Crescent St. $300,000. Architect not appointed.

Ill., Danville—Bd. Local Impvts., V. Yoemans, pres., school. $200,000. Architect not appointed.

Ill., Macomb—State of Illinois, Capitol Bldg., Springfield, bids late this fall 3 story, basement training school at Western State Teachers College, $300,000. State Div. of Architects & Engineers, Capitol Bldg., Springfield, archts.

Ind., Tipton—St. Josephs Academy plans by C. Houck, 515 Ashland Ave., Muncie, St. Katherine Hall Academy, rein.-con., brick, hollow tile. $150,000.

Md., Baltimore—Mayor and City Council, City Hall, plans by A. C. Radziszewski, 425 South Ellwood Ave., brick, steel school, Mosher and Wheeler Sts., $150,000; plans by Machen & Dixon, 312 North Charles St., brick, steel, concrete school, Frederick and Fulton Aves., $275,000.

Md., Baltimore — Loyola High School, 700 North Calvert St., sketches by J. A. Ahlers, 529 North Charles St., brick, stone high school, Boyce Ave. $200,000.

Mass., Boston—City, Dpt. School Buildings, plans by Desmond & Lord, 1 Beacon St., Boston, and soon takes bids 2 story, basement, brick, limestone, steel, plain found., Prescott Emersgon Dist., East Boston. To exceed $150,000.

Mass., Lee—Town, C. Miller, supt. schools, bids in spring, high school addition, $150,000 appropriation delayed. M. W. Maloney, 23 Pearl St., Springfield, archt.

Mass., Melrose—City, Building Com., A. M. Tibbetts, chn., soon takes bids, 2 story, basement, brick, stone, steel high school addition, plain found., Main St. $715,000. J. W. Beal Sons Co., 185 Devonshire St., Boston, archts.

Minn., Minneapolis — Bd. Educ., 305 City Hall, bids probably in November, Sheridan School. $500,000. E. H. Enger, engr. and archt.

Mo., St. Louis—Bd. Educ., 911 Locust St., sketches 3 story, rein.-con., brick, stone, Carondelet Dist. $300,000. E. T. Friton, c/o owner, building comr.

N. J., Carlstadt—Bd. Educ., Boro Hall, Junior High School, receiving competitive sketches 2 story, basement, brick, steel, Washington St. $150,000. Architect not appointed. Noted Oct. 8.

Schools (Continued)

N. J., Cliffside Park—Bd. Educ., Palisade Ave., will not build 2 story, basement addition to School 3. $280,000 bonds defeated. R. J. Cadien, 545 Gorge Rd., Grantwood, archt. Noted Sept. 10.

N. J., Cliffside Park—Bd. Educ., Palisade Ave., will not build high school addition. Palisade Ave. $325,000 bonds defeated. R. J. Cadien, 545 Gorge Rd., archt. Noted Sept. 10.

N. J., Florham Park—Bd. Educ., R. H. Allen, pres., bids latter part November, 2 story, basement, brick, steel, Ridgedale Ave., $150,000. Rasmussen & Wayland, 36 West 57th St., New York, archts., Clark McMullen & Riley, 101 Park Ave., New York. Noted Sept. 3.

N. J., Jersey City—Bd. Educ., Harrison Ave., 2 story, basement, brick, steel truant's school, rear State Normal School. $150,000. **Maturity probably soon.** Architect not appointed.

N. J., Jersey City—St. Peters College, J. S. Dinneen, pres. 1 Newark Ave., 10 story, basement, brick, steel, Hudson Blvd. and Linden Park. $150,000 or more. **Maturity probably soon.** Architect not appointed.

N. J., Metuchen—Bd. Educ., High School, altering and constructing addition to Franklin School. $150,000. **Maturity probably soon.** Architect not appointed.

N. J., Middlesex — Bd. Educ., Watchung School, Fischer Ave., 2 story, brick, steel high school. $150,000. **Maturity probably soon.** Architect not appointed.

N. J., River Edge—Bd. Educ., Boro Hall, 2 story, basement, brick, steel, Howland Ave. $200,000 bonds defeated. J. L. T. Tillack, 173 Main St., Hackensack, archt. Noted Sept. 17.

N. J., Roselle Park—Bd. Educ., M. Williams, pres., Chestnut St., 2 story, basement, brick, steel addition, Harrison Ave., $150,000; 2 story, basement, school, Stony Farm. $150,000. **Maturity probably soon.** Architect not appointed.

N. J., Trenton Junction—Dpt. Institutions & Agencies, State House, Trenton, bids about December, industrial school building at State School for Deaf. $200,000. Gilbert & Betelle, 20 Branford St., Trenton, archts. Noted Sept. 15.

N. Y., Clinton—Hamilton College plans by Bagg & Newkirk, U.G.&E. Bldg., Utica, gymnasium, incl. swimming pool, showers. $425,000. Noted Oct. 22.

N. Y., New York—Society for Ethical Culture, 2 West 64th St., soon lets contract school, Fieldston Ave. $250,000. Bids in. Kohn & Butler, 56 West 45th St., archts. Noted Oct. 8.

R. I., East Providence (br. Providence) — Town, J. R. D. Oldham, supt. builders, additions to A. E. Pratt Elementary School, Burnside Ave., and Bliss Grade School, Orlo Ave. $150,000. Architect not appointed.

R. I., East Providence (br. Providence)—Town, J. R. D. Oldham, supt. schools, addition to Junior and Senior High School, Bway., and Taunton Ave. $150,000 or more. Architect not appointed.

Tex., College Station—State of Texas A. & M. College, plans by F. E. Giesecke, college archt., College Station, 2 and 3 story, brick, rein.-con. steel, clay tile engineering shop, plain found. $200,000. Will probably purchase materials and erect under supervision of College Superintendent. L. D. Royer, Smith-Young Tower, San Antonio, engr.

Tex., San Antonio—San Antonio State Hospital, South Presa St., plans by Wilder & Smith and H. Phelps, assoc. archt., Hicks Bldg., 2 story, 70 x 120 ft., brick, rein.-con. dormitory, plain found. $100,000-$150,000.

Wis., Menasha—Bd. Educ., W. G. Remmel, mayor, City Hall, sketches rein.-con., brick school. $150,000. Architect not appointed.

Ont., Toronto—University of Toronto, Queens Park, plans by Mathers & Haldenby, 96 Bloor St. W., and soon takes bids 3 story, basement, brick, stone, concrete steel addition to hygiene building at Toronto University. $300,000.

Que., Montreal—Roman Catholic School Comn., 117 Ste. Catherine St., plans by Gascon & Parent, 934 Ste. Catherine St. W., concrete, stone school for Louis Jobet Parish. $150,000.

Que., Montreal—Mount St. Louis College plans by C. David, 1440 St. Catherine St. W., 7 story, rein.-con., stone, brick addition to college, Sherbrooke St. W. $250,000.

BIDS ASKED

Calif., Berkeley—Nov. 7, by Regents of University of California, 2 story, Class A, steel, concrete men's gymnasium building. $1,000,000. Noted Jan. 29.

La., New Orleans — R. Rathbone, Hibernia Bank Bldg., bids about Nov. 30, general contract Most Holy Name of Jesus School building. $200,000.

Md., Annapolis—School Comrs. Anne Arundel Co., G. T. Fox, bids about Dec. 19, high school. $325,000. Buckler & Fenhagen, 325 North Charles St., archts. Noted Apr. 2.

Md., Baltimore—Mayor and City Council, City Hall, bids about Jan. 19, 3 story, basement, brick, steel, concrete school for handicapped children, North, Windsor, Warwick and Wheeler Aves. $600,000. Mackenzie & Cross, 330 North Charles St., archts.; brick, steel concrete school for handicapped colored children, Franklin and Schroeder Sts., $350,000. W. F. Stone, Jr., 2612 North Charles St., archt. Noted Feb. 12 and Apr. 2 respectively.

Mass., Cambridge—City School Building Com. bids about Dec. 1, Rindge Technical School, 3 story, basement, brick, steel, concrete, concrete found., Bway. and Irving St. $1,500,000. R. H. Doane, 60 Batterymarch St., Boston, archt.

Neb., Wayne—Nov. 9, by C. W. Taylor, supt., State Teachers College, State Bd. Control, 3 story, concrete, brick girls dormitory. $150,000. A. D. Baker, Clune Bldg., Grand Island, archt.

N. J., West Orange—Nov. 10, by Bd. Educ., High School North Field Ave., general contract Junior High School, 3 story, 100 x 225 ft., brick, rein.-con., steel Gilbert St. $150,000. Hacker & Hacker, 201 Main St., Fort Lee, archts. Noted Oct. 1.

N. Y., Albany—Dec. 3, by Commissioner Educ., Education Bldg., altering Gideon Hawley Building, New York State College for Teachers.

N. Y., Delhi—Dec. 3, by Commissioner Education, Education Bldg., Albany, school at State School Agriculture and Domestic Science.

N. Y., New Paltz—Dec. 3, by Commissioner Education, Educ. Bldg., Albany, practice school, New York State Normal School.

Wis., Wauwatosa—Oct. 30, by Bd. Educ., Junior High School, 3 story, basement, 150 x 250 ft., Cottrell St. Former bids rejected. Herbst & Kuernzli, 653 Franklin Pl., Milwaukee, archts.

CONTRACTS AWARDED

Calif., Berkeley—State Div. Architecture, Sacramento, general contract 2 story school, 1 story dining hall, both rein.-con. at Home for Blind, to K. E. Parker Co., 135 South Park St., San Francisco, $162,000; electrical work and heating, ventilation to Alta Electric Co., 938 Howard St., San Francisco, $14,485 and $16,960 respectively; plumbing, to Mechanical Contr. Co., 83 Shipley St., San Francisco, $3,360. Grand total $196,805. Noted Oct. 1.

Mass., East Boston (sta. Boston)—City of Boston, Dpt. School Buildings, 3 story, basement, brick, limestone, plain found., Chapman Dist., to Ruzo Constr. Co., 80 Boylston St., Boston, $143,747. Noted Oct. 1.

Mass., Lowell—St. Michael's Roman Catholic Parish, J. J. Shaw, pastor, 6th St., 3 story, basement, brick, steel convent, plain found., 6th St., to Edwards & Monahan, 219 Central St. Est. $150,000 or more. Noted Sept. 10.

N. H., Exeter—Phillips Exeter Academy, L. Perry, brick, limestone, steel dormitory, to L. H. Shattuck, Inc., 208 Granite St., Manchester. Est. exceed $150,000. Noted Oct. 15.

N. J. Kearny (br. Arlington)—Bd. Educ., E. Stevenson, secy., Garfield School, for Roosevelt School, 3 story, basement, 65 x 210 ft., brick, steel, rein.-con. found., to Reynolds Constr. Co., 95 Halsey St., Newark, $196,990. Noted Oct. 15.

N. J. Middlebush—Bd. Educ., Franklin Twp., H. Kline, pres., general contract 2 story, basement, brick, steel, rein.-con., Pine Grove Ave., to C. Garlotti, 421 Livingston St., New Brunswick; plumbing, to Adams & Mulready, 332 Benner Ave., Highland Park; electrical work, to Smith Electric Co., 338 Broad St., Trenton; steel and ornamental iron, to Elizabeth Iron Wks., 127 Franklin St., Elizabeth. Est. $150,000. Noted Sept. 24.

N. J., Montclair—Bd. Educ., F. P. Reagle, secy., 22 Valley Rd., general contract 4 story, basement, brick, steel addition to Glenfield School, to C. A. Vezzetti, 50 Brick Lane, Palisade, $240,000; plumbing, to Jachnig & Peoples, Inc., 223 13th Ave., Newark, $31,295; heating, to F. L. Emmons, 14 Glenwood Rd., Montclair, $52,000; electrical work, to Shaw Electric Co., 102 Central Ave., Newark, $36,400; steel and iron, to Standard Iron Wks., 114 Badger Ave., Newark, $11,741. Grand total $371,436. Noted Oct. 1.

N. J., Morristown—Bd. Educ., O. M. Goble, dist. clk., 50 Early St., general contract 2 story, basement, 160 x 175 ft., brick school, to Main Constr. Co., 110 Park Pl., Passaic, $194,395; plumbing, to J. F. Smith, 81 Monticello Ave., Newark, $14,400; heating, to G. J. Tobin, 187 North Ave., Plainfield, $37,995; electrical work, to N. Eglowsteen, 432 Belmont Ave., Newark, $13,500; steel, ornamental iron, to Elizabeth Iron Wks., 127 Franklin St., Elizabeth, $12,400. Grand total $272,690. Noted Oct. 15.

N. Y., Brooklyn—St. Vincent Ferrer's Roman Catholic Church, F. Murphy, pastor, 3624 Glenwood Ave., general contract school, to F. Droesch, 110-18 Jamaica Ave., Richmond Hill. Est. $165,000. Noted Oct. 1.

N. Y., Ithaca—Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, agricultural economics building, New York State College of Agriculture, Cornell University, to Wark Co., 1608 Walnut St., Phila., Pa., $454,000; heating, to W. W. Wetmore, 259 Delaware Ave., Buffalo, $35,479; electrical work, to J. F. Morrissey, 405 Lexington Ave., New York, $28,750; sanitary work, to Barr & Creelman, 74 Exchange Pl., Rochester, $13,677. Grand total $531,906. Noted Sept. 17.

N. Y., New York — Columbia University, Bway. and 116th St., 6 story, 107 x 167 ft. library and School of Library Service, 521-41 West 114th St., to Marc Eidlitz, 100 East 42nd St. Est. $3,000,000. Contractor soon takes bids on structural steel and other separate contracts. Noted July 2.

N. Y., St. George—Bd. Educ., 500 Park Ave., New York, general contract Staten Island Vocational and Continuation School, to Royal Rice Co., Inc., 139 East 57th St., New York, $736,000. Noted July 30.

R. I., Warwick—Town, W. E. Sherman, supt. schools, 2 story, basement, 70 x 85 ft., brick, steel school addition, to Hanson & Erickson, Greenwood Ave., Greenwood. Est. $150,000. Noted Oct. 1.

Tex., Galveston—City, c/o J. Neathy, pres. School Bd., 2 story, brick, stone, hollow tile, rein.-con. high school, incl. auditorium, library, cafeteria, gymnasium, class rooms, 39th St. and Ave. T., to M. C. Bowden, 1801 C St. $285,769; plumbing and heating, to A. J. Warren, 2313 E St., $53,396; electric wiring, to Martin Wright Electric Co., Navarro St., by Auditorium, San Antonio, $17,721. Grand total $356,886. Noted Sept. 24.

Wis., Milwaukee—Marquette University, cut stone for 4 story, basement, 145 x 260 ft. medical school, to Volkening Cut Stone Co., 139 South 16th St.; structural steel to Milwaukee Bridge Co., 3282 North 34th St.; ornamental iron, to W. F. Eichfeld & Son, 135 East Pittsburg Ave. Noted Sept. 24.

BANKS

PROPOSED WORK

N. Y., New York—First National Bank of New York, 2 Wall St., plans bank and office or office building, Wall St. and Bways. Architect not appointed.

CONTRACTS AWARDED

N. Y., Brooklyn—First Natl. Bank Mortgage Securities Corp., general contract 1 story, bank, Pitkin and Hopkinson Aves., to W. Kennedy Constr. Co., 215 Montague St. Est. $150,000. Noted Oct. 22.

OFFICES

PROPOSED WORK

Calif., Los Angeles—De Luxe Building Co., W. M. Garland Bldg., plans by L. T. Somers, Union League Bldg., 4 story, basement, steel, concrete, Long Beach Blvd. $250,000.

Mass., Springfield—Springfield Gas Co., A. B. Tenney, 35 State St., sketches by C. H. Tenney Co., 200 Devonshire St., Boston, brick, steel office addition, State St. $150,000.

N. M., Albuquerque—Owner, c/o Gaastra & Gladding, archts., Romero Bldg., sketches, 10 story, steel, terra cotta office. $300,000.

BIDS ASKED

Mo., St. Louis—T. M. Sayman Investment Co., 2117 Franklin Ave., taking bids excav., rubble masonry, bricklaying for 2 story, basement, 150 x 175 ft. commercial building. Owner builds by separate contracts, furnishes materials.

CONTRACTS AWARDED

Calif., Walnut Park—H. Evans & Co., W. M. Garland Bldg., Los Angeles, 4 story, basement, 100 x 120 ft., concrete, steel, plaster exterior, steel sash, marble, office and professional building, Long Beach Blvd. and Walnut St., to De Luxe Building Co., W. M. Garland Bldg., Los Angeles. Est. $250,000.

Mo., St. Louis—See "Bids Asked."

STORES

PROPOSED WORK

Minn., St. Paul—J. Friedman, 436 Wabasha Ave., plans by Ellerbe & Co., 525 Minnesota Bldg., 122 x 175 x 300 ft. building, incl. stores on 2 streets, 5 story garage in center, 8th, 9th, Cedar and Minnesota Sts. $1,000,000.

Pa., Sharon—M. Belotin & Son, 41 Sharpsville St., plans by E. S. Hanna, 7 Ekker Bldg., and probably takes bids in spring, 3 story, basement, 34 x 85 ft., brick, hollow tile, cut stone, steel store, incl. wrecking old building on site, Sharpsville and Pitt Sts. $150,000.

CONTRACTS AWARDED

Mass., Boston—De Blois & Naddisen, Barrister Hall, remodeling 5 story, basement, brick, steel store and office, 171 Tremont St., to Gerry & Northrup, 494 Harrison Ave. Est. $150,000.

N. J., Trenton—J. B. Van Sciver Co., Market St. Ferry, Camden, 2 story, stone, concrete store, South Broad St., to W. Steele & Sons, 15th and Cherry Sts., Phila., Pa. $500,000.

PUBLIC

PROPOSED WORK

Calif., Santa Cruz—CITY HALL—City, City Hall. $250,000. Architect not appointed.

Conn., Greenwich—POLICE and FIRE STATION—Town, Bd. Selectmen, Town Hall, new police and fire station. $200,000. Architect not appointed.

Conn., New Haven—CITY HALL and AUDITORIUM—City, T. A. Tully, mayor, sketches (2nd unit) city hall and auditorium, Church and Orange Sts. $2,000,000. **Maturity indefinite.**

Delaware—STATE WALFARE—State plans by Massena & DuPont, 921 Market St., Wilmington, state welfare building on DuPont Blvd., between Dover and Smyrna. $250,000

Mass., Chicopee—FIRE STATIONS—City, E. Cloutier, mayor, City Hall, 2 fire stations, George St. and Willimansett Sect. $150,000 or more. Architect not appointed.

Ore., Portland—MARKET—City soon takes bids 1, 2 and 3 story, 133 x 616 ft. public market, incl. railroad connections, streets, watermains, track sheds, refrigeration, cold storage, Foot Yawhill St. and river front. $1,250,000.

BIDS ASKED

Calif., San Francisco—WAR MEMORIAL and OPERA HOUSE—Nov. 3, by War Memorial Trustee for City and San Francisco Co., carpentry and mill work for war memorial project, Civic Center. Noted Sept. 11, 1930.

Ind., Michigan City — CELL HOUSE — See "Contracts Awarded."

Minn., St. Paul—OFFICE—Nov. 17, by Comrs. Administration & Finance, Capitol, 7

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Public (Continued)

story, basement, 140 x 250 ft. rein.-con., brick, granite facing, office Wabasha St. and Park Ave., $1,000,000. C. H. Johnston, 360 Robert St., archt. Noted Oct. 14 Daily.

N. J., Bordentown—PRISON FARM—Nov. 10, by C. N. Leathem, Jr., archt., State Office Bldg., Trenton, housing for prisoners at State Prison Farm, $200,000.

N. J., Holmdel—ADMINISTRATION—Nov. 12, by C. N. Leathem, archt., State Office Bldg., Trenton, 3 story, administration building, State Hospital, $150,000.

N. Y., Jamaica—COURT HOUSE—Nov. 2, by G. U. Harvey, pres. Queens Boro. Queens Subway Bldg., Long Island City, children's court house, Union Hall St, 181.98 ft. north of South Rd. Noted Oct. 1.

N. Y., Attica—CELL, etc.—Nov. 24, by Commissioner Dpt. Mental Hygiene, State Office Bldg., North Cell housing, reception and disciplinary building, auditorium and chapels, school, covered ways and arcades, service connections, Attica State Prison.

N. Y., Pine Aire Station—FARM BUILDINGS—Nov. 24, by Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, farm buildings, Pilgrim State Hospital.

N. Y., Ossining—SEGREGATION—Oct. 29, by Comr. Correction, State Office Bldg., Albany, segregation building, connecting corridor, Sing Sing Prison.

CONTRACTS AWARDED

Ind., Michigan City—CELL HOUSE—Indiana State Prison, 3 story, basement, 400 cells, brick, steel, by convict Labor. $200,000.

N. H., Claremont—ARMORY—State, W. A. Stone, purch. agt., State House, 2 story, basement armory, to A. F. Smiley Constr. Co., 202 Oak Hall Bldg., Pawtucket, R. I. Est. $150,000. Noted July 9.

Tex., Graham—COURT HOUSE—Young Co., c/o Judge, 2 story, basement, 80 x 122 ft., rein.-con., Bedford stone, to J. Taylor, Aviation Bldg., Fort Worth. Est. $300,000.

UNCLASSIFIED

PROPOSED WORK

Calif., Los Angeles—PASSENGER STATION—See "Railways under California."

Conn., Hartford—EXCHANGE—Southern New England Telephone Co., 157 Church St., New Haven, telephone exchange addition, $150,000 or more. Architect not appointed.

Me., Portland—EXCHANGE—New England Telephone & Telegraph Co., 50 Oliver St., Boston, sketches by Densmore, Le Clear & Robins, Park Square Bldg., Boston, exchange building. To exceed $150,000.

Mass., Chelsea (br. Boston) — AMERICAN LEGION — American Legion, Chelsea Post 34, Shurtleff St., building, Shurtleff St. $150,000 or more funds being raised for same. Architect not appointed.

Ont., Ottawa—MAUSOLEUM—Canada Mausoleums Ltd., Ottawa Electric Bldg., mausoleum, Notre Dame Cemetery. $250,000.

BIDS ASKED

Tex., Fort Worth—PASSENGER STATION, etc.—Nov. 15, by Santa Fe Ry. Co., W. W. Kelley, ch. engr. (Western Lines) Amarillo, 2 story, 91 x 245 ft., brick, cut stone, passenger station; bids about Nov. 15, 2 story, basement, 50 x 140 ft. rein.-con. stone freight house and train shed, Jones St. Total est. $1,000,000. Noted Oct. 15.

CONTRACTS AWARDED

N. J., Westwood—STATION, etc.—Erie R.R. Co., G. S. Fanning, ch. engr., 101 Prospect Ave. S.W., Cleveland, O., general contract 2 story, basement, brick, steel railroad station and platform, to W. J. Lange Inc., 1025 Hoyt Ave., Ridgefield Park. Est. $150,000.

N. Y., Glens Falls—EXCHANGE—New York Telephone Co., 140 West St., New York, telephone exchange, to J. T. Turner, 41 East Main St., Amsterdam. Est. $150,000. Noted Oct. 8.

Industrial Buildings

FACTORIES AND MILLS

PROPOSED WORK

Calif., San Francisco—PRE-COOLING PLANT—California State Bd. Harbor Comrs., Ferry Bldg., sketches 4 story, rein.-con. addition, China Basin, $500,000. F. G. White, Ferry Bldg., engr.

Mass., West Warren—TEXTILE MILL—Maryland Silk Co., 285 Straight St., Paterson, N. J., acquired Factory 5, of Thorndike Co., and plans altering, re-equipping same. To exceed $40,000.

N. J., Elizabeth—FACTORY—Elizabeth Lumber Co., M. Goldberg, in charge, 1057 East Grand St., soon lets general contract 2 story, basement, brick, steel, East Grand St. $40,000. J. Anderson, 251 North Broad St., archt.

N. Y., New York—LAUNDRY—Hunts Point Wet Wash Laundry, Garrison and Longfellow Aves., plans by H. Fenichel, 220 East 42nd St., 1 story, 100 x 100 ft. laundry, Garrison and Longfellow Aves. $40,000.

N. C., Marble—MARBLE FINISHING PLANT—Columbia Marble Co., 303 Scottish Pk., Knoxville, Tenn., marble finishing plant and opening new marble quarry. $125,000.

O., Cleveland—FACTORY—De Nock Mfg. Co., K. E. Weigle, pres., 875 East 140th St., sketches brick factory. $50,000.

Okla., Oklahoma City—GLASS PRODUCTS PLANT—Vitric Products Co., 215 Commerce Exch. Bldg., plant. $200,000. F. W. Fenten, 215 Commerce Exch. Bldg., engr.

Texas—CANNING PLANTS—J. B. Chilton, Jr., Encinal, sketches 2 canning plants, one at Encinal other at Laredo. Private plans.

Tex., Anson—CHEESE PLANT—Kraft-Phenix Cheese Corp., 400 Rush St., Chicago, Ill., and Denison, Tex., c/o A. J. Riddle, sketches 1 story cheese plant.

Tex., Lampasas — POULTRY PLANT and REFRIGERATION—Ft. Worth Poultry & Egg Co., 719 East 9th St., sketches 1 story, frame addition, plain found. Private plans.

N. S., Baddeck — PLANT — North American Gypsum Co. plant. $150,000.

BIDS ASKED

Calif., Los Angeles—INDUSTRIAL—Dec. 1, by Goodwill Industries, 342 North Main St., 3 story, 70 x 145 ft., rein.-con., San Fernando Rd. near Pasadena Ave. $60,000. Marsh, Smith & Powell, 516 Architects Bldg., archts.

N. Y., New York—ORGAN FACTORY—Atlas Organ Co., lessee, 726 Jackson Ave., taking bids and awards general contract about Nov. 15, 2 story, 44 x 103 ft. pipe organ manufacturing plant, 239th St. and Bullard Ave., for P. Sawada, Yonkers. To exceed $40,000. E. Gower, Yonkers, archt.

CONTRACTS AWARDED

Conn., Meriden—PLANT—International Silver Co., J. A. Hutchinson, 48 State St., altering Buildings 1 and 2, Factory E, to Bartlett-Brainand Co., 252 Asylum St., Hartford. Est. $40,000 or more.

Conn., New Haven—LABORATORY—Connecticut Agricultural Experimental Station, W. L. Slate, Hunnington Rd., Jenkins Laboratory, brick, to Allwyn Wadham Co., 15 Lewis St., Hartford, $62,976. Noted July 9.

Ind., Sheridan—CONDENSED MILK PLANT—Condensed Milk Co., general contract 3 story, 75 x 130 ft., rein.-con., brick, steel, to T. A. Moynahan Co., 710 Union Title Co., Indianapolis. Est. $40,000.

Mass., Boston — MANUFACTURING—Lewis Wharf Corp., 39 Lewis Wharf, 5 story, basement, brick (fire reconstruction), to W. T. Stephens Constr. Co., 100 Atlantic Ave.

Mass., Whitman—FACTORY—United Shank & Findings Co., c/o United Shoe Mchy. Corp., 140 Federal St., Boston, 2 story addition, to Casper-Ranger Constr. Co., 6 Newton St., Holyoke. Est. exceeds $40,000. Noted Sept. 24.

Mass., Lawrence—FACTORY—F. E. Snow, Bradford St., altering and constructing 1 story, basement, brick addition, Bradford and West Sts., to L. C. Cyr, 45 Melrose St. Est. $40,000.

N. J., Jersey City — LAUNDRY — Crystal Laundry Co., J. Feldman, pres., 333 West Side Ave., general contract 1 story, basement, brick, steel addition, to G. Patrizio, 76 Montgomery St. Est. $40,000.

N. J., Wallington—BAKERY PLANT, etc.—J. Boruta, 103 Halsted St., general contract 2 story, basement, 75 x 75 ft., brick, steel bakery plant, stores, garages, to F. Gembala, 12 Van Buren St., Passaic. Est. $40,000. Noted Sept. 24.

N. Y., New York—PUMP HOUSE—Consolidated Gas Co., 4 Irving Pl., pump house Hunts Point Ave. and Bronx River, to Bartlett-Haywood Co., 200 Scott St., Baltimroe, Md. Est. $50,000.

Pa., Washington—PACKING PLANT—Albert Packing Co., Cecil, G. Albert in charge, concrete, steel, brick, to R. M. Day, 250 Donnam Ave. Est. $40,000. Noted Sept. 22.

Wyo., Casper—REFINERY—Standard Oil Co. of Indiana, 137 West 11th St., Indianapolis, Ind., 6,500 bbl. p.d. (cracking unit) refinery, to M. W. Kellog Co., 225 Bway., New York.

Ont., Port Arthur—FACTORY—Coca Cola Co. of Canada Ltd., 90 Broadview Ave., Toronto, 1 story, 50 x 60 ft., brick, Algoma and Queen Sts., to A. Beck, 347 Cornwall Ave.

GARAGES

PROPOSED WORK

Calif., San Diego—See "Warehouses."

Mass., Boston — Realty Constr. Co., 161 Devonshire St., (taking over project of Boston Terminal Co., A. V. Russell, in charge, South Station), altering terminal basement in South Station into 1 story garage. To exceed $40,000. Blackall, Clapp, Whittemore & Clark, 31 West St., archts. Noted Aug. 20.

N. Y., Brooklyn—E. Burak, 220 Meeker Ave., sketches by M. Klein, 65 Court St., 100 x 140 ft. service garage, Meeker and Stewart Aves. $40,000.

N. Y., Brooklyn—M. H. Renken Dairy Co., 584 Myrtle Ave., 2 story service garage, storage and dairy, Classon St. and Myrtle Ave. $40,000. Koch & Wagner, 32 Court St., archt.

BIDS ASKED

Me., Bangor — A. E. Webber, c/o Webber Motor Co., 142 Exchange St., taking bids 1 story, basement, 90 x 175 ft., brick, steel, auto sales and service station, plain found., Hammond St. To exceed $40,000. F. A. Patterson, 16 Central St., archt.

Mass., Brockton—Packard Car Agency, Warren Ave., taking bids 1 story, 100 x 200 ft., brick, steel garage, concrete found., Warren Ave. $50,000 or more. J. W. Beal Sons Co., 185 Devonshire St., Boston, archts. Noted Sept. 17.

N. J., Union City—Owner, c/o J. G. Helmers, archt., 147 Summit Ave., bids about Feb. 1, general contract 2 story, brick, steel, rein.-con. garage. $150,000.

R. I., Providence—See "Contracts Awarded."

CONTRACTS AWARDED

Ind., Franklin—Gulf Refining Co., general contract rein.-con., steel glazed tile, superservice station, West Jefferson St., to R. C. Bryant Co., Franklin. Est. $40,000.

N. J., Newark—Bd. City Comrs., City Hall, general contract 2 story, basement, 180 x 190 ft., brick, steel auto service repair shop, garage to D. J. Cronin, 713 South Orange Ave., $211,754; plumbing, to J. F. Smith, 81 Monticello Ave., $11,110; heating and ventilating, to Newark Heating Co., 131 South 12th St., $22,322; electrical work, to K. W. Electric Co., Inc., 49 Lawrence St., $16,345; steel and iron, to Breen Iron Wks., 272 Badger Ave., $49,400. Grand total $310,831. Noted Oct. 14 Daily.

N. Y., Brooklyn—Reid Ice Cream Corp., 542 Waverly Ave., 1 story, 95 x 99 ft. service garage, to Equity Constr. Co., 25 West 43rd St., New York. Est. $40,000. Noted Oct. 15.

N. Y., Comstock—Commissioner Correction, State Office Bldg., Albany, garage, machine and blacksmith shop at Great Meadow Prison, to MacDonald Spencer Eng. Co., 1628 Graybar Bldg., New York, $38,950; heating, to Hudson Falls Hardware Co., 186 Main St., Hudson Falls, $1,969; sanitary work, to Barcham & McFarland, 136 North St., Rochester, $2,444; electrical work, to W. W. Gottburg, 214 Roxborough Rd., Rochester, $4,970. Grand total $51,333. Noted Sept. 17.

R. I., Charlestown—State, State Bd. P. Roads, State House Providence, brick garage, tool shop, to New England Concrete Co., 75 Westminster St., Providence. Est. $40,000.

R. I., Providence—J. J. Finnegan, 134 Sharon St., 1 story, brick, concrete, steel service garage, 149 West Park St., day labor. $40,000. W. G. Richards, 49 Westminster St., archt. Noted Oct. 1.

POWER PLANTS

PROPOSED WORK

Ia., Remsen—City, J. Gamerdinger, clk., light and power plant $75,000. C. A. Trimmer, Madison, S. D., engr. Noted Sept. 22.

Okla., Pryor—City Council defeated $100,000, power plant. Long & Co., 1300 Colcord Bldg., Oklahoma City, engrs. Noted Aug. 6.

BIDS ASKED

Mo., Sullivan—Nov. 12, by N. W. Shaffer city clk., 43 x 50 ft. brick power house, 15,000 gal. oil storage tank, 2 Diesel engines, generators, exciters, auxiliaries, water cooling tower, 8-panel switchboard 600 kw. capacity, electric distribution system, electric connections and station wiring. W. A. Fuller Co., 2916 Shenandoah Ave., St. Louis, engr. Noted Sept. 17.

N. Y., Ossining—Dec. 10, by Commissioner Correction, State Office Bldg., Albany, power house, knit shop, tunnels, heating and electric connections, apparatus for Sing Sing Prison.

CONTRACTS AWARDED

Mich., Wyandotte—City, Municipal Service Comm., 85 ft. high, 70 x 100 ft., brick, steel, concrete boiler plant with skip hoist, tower to house 2 boilers, to H. G. Christman Burke Co., Fisher Bldg., Detroit, $149,975. Noted Oct. 1.

SHOPS AND FOUNDRIES

BIDS ASKED

N. Y., Poughkeepsie—SHOP, etc.—Nov. 6, by Commissioner Architecture, State Office Bldg., shop and storage building, Dpt. P. Wks.

CONTRACTS AWARDED

Mass., Dorchester—AUTO REPAIR SHOP—Massachusetts Auto Serv., 1228 Massachusetts Ave., 1 story, 60 x 150 ft., rein.-con., steel to D'Amore Constr. Co., 89 State St., Boston. Est. $40,000. Noted Oct. 1.

Wyoming—SHOPS—See "Streets and Roads."

WAREHOUSES

PROPOSED WORK

Calif., San Diego—San Diego Co. probably rein.-con. warehouse, garage, 15th and F Sts. $200,000.

BIDS ASKED

N. Y., Hudson—Dec. 3, by Superintendent Standards & Purchase, State Capitol, Albany, storehouse and dairy barn at New York State Training School for Girls.

CONTRACTS AWARDED

Fla., Jacksonville—Wade Investment Co., warehouse, bakery, West Beaver St., to C. H. Hornstein, 2756 Park St. Est. $100,000. Great Atlantic & Pacific Tea Co., 420 Lexington Ave., New York, lessee.

N. Y., Brooklyn — Paramount Ice Co., 89 Steuben St., 1 story, basement, 75 x 100 ft. ice storage, Emerson Pl. and Myrtle Ave., to C. Werner, 101 Hale St. Est. $60,000. Noted Oct. 8.

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